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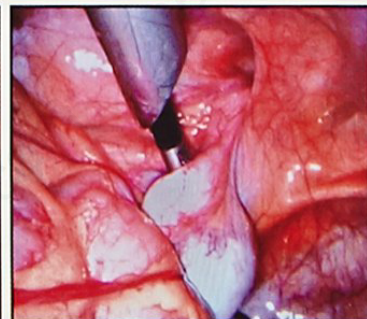
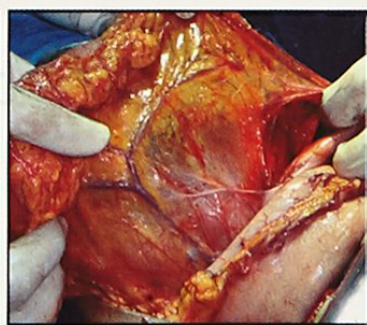
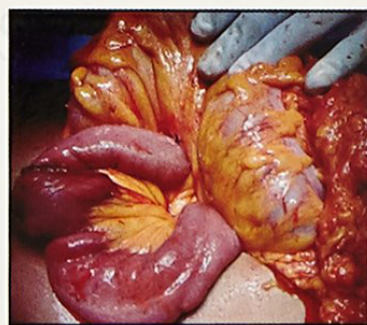
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Surgery Essence

Surgery Essence

Fourth Edition

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Dedicated to

***My Parents
and
Uncle, Dr CP Singh***

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Preface to the Fourth Edition

I thought writing the preface for the fourth time would be an easier job but it is actually a lot tougher because now you already know me very well. This brings many responsibilities with it, the most important of which is to keep the students satisfied.

I can proudly say that all my students have contributed a lot to get me to this place, where I am today. They have helped me in becoming a better teacher, a better author and most importantly a better human being. I take this opportunity to thank all of you. The happiness you all give me keeps me telling always to work harder to bring a positive change in the life of my students. This will be reflected in the pages of this book. I always strive to provide a winning edge to my students.

Higher education has become necessary, as graduation alone is found inadequate in this highly competitive and dynamic world. Trends in the way the questions are being asked are changing continuously. I am pleased to present this edition of *Surgery Essence* replete with new trends in the field of surgery. The recent questions and their concepts have been highlighted and have been written in a way that will help the students to remember and reproduce them in the examination hall. The information provided is cogent but concise to save the precious time, as we all know the clock is ticking. Time is one thing that can never be recovered once gone. Be careful!

I am passionate about excellence. Excellence in the field of education and in my efforts to groom my students to make them confident enough, that they lose the fear of failure. In order to succeed, your desire for success should be greater than your fear of failure.

PG entrance examination has made the medical world very competitive and has made it imperative for students to acquire all the skills and competencies to deliver results. My aim as an author is to provide students with a learning experience which when amalgamated with perseverance and commitment helps them in achieving goals.

I still am not sure about one thing that who is more happy when a student achieves something, the student or the teacher, but I am very sure that the teacher is more satisfied when he sees his students achieving what they deserve and desire. I am working day and night to get that satisfaction and you have to work equally hard so that you do not let me down.

I always tell my students to dream big but not while sleeping. When you dream of moon, you will at least fall amongst stars. But these dreams should always be accompanied with intelligence and hard work. To guide you work intelligently this book and the author, both are there with you throughout the year. But the hard work is totally in your hands. Accept responsibility for your life. Know it is you who will get you where you want to go, no one else.

I believe that all my students should know the importance of challenges. Challenges are what make life interesting and overcoming them is what makes life meaningful. For the time being the only challenge that you should be facing is to secure a good rank in the entrance exam. One of the most important keys to success is having the discipline to do what you know you should do, even when you do not feel like doing it. Nobody ever wrote down a plan to be broke, lazy or stupid. These things happen when you do not have a plan.

I should now conclude with my prayers and wishes for all of you. Hope you all reach your dreams. All the best...



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SECTION 1

ENDOCRINE SURGERY

CHAPTERS

- ❖ Breast
- ❖ Thyroid
- ❖ Parathyroid and Adrenal Glands

MULTIPLE CHOICE QUESTIONS

NIPPLE DISCHARGE

- Blood stained nipple discharge is seen in:** (DNB 2013, DNB 2011, Orissa 2011, PGI June 2009, UPPG 2010, AIIMS Nov 2003, All India 2005)
 - Breast abscess
 - Fibroadenoma
 - Ductal papilloma
 - Fat necrosis of breast
- Bleeding from nipple is seen in:** (PGI June 2001, June 97)
 - Fibroadenoma
 - Duct ectasia
 - Ductal papilloma
 - Chronic breast abscess
 - CA breast
- Green discharge is most commonly seen with:** (Kerala PG 2015, WBPG 2015, AIIMS Nov 98)
 - Duct papilloma
 - Duct ectasia
 - Retention cyst
 - Fibroadenosis
- A 25-years old female complains of discharge of blood from a single duct in her breast. The most appropriate treatment is:** (All India 2008)
 - Radical excision
 - Microdochectomy
 - Radical mastectomy
 - Biopsy to rule out carcinoma
- True statement (s) about nipple discharge is/are:** (PGI June 2004)
 - Mammography
 - Cone excision done in single intraductal tumour
 - Mammography done when duct papilloma is <4.5cm
 - Red discharge indicate malignancy
 - Blue-black discharge indicate duct ectasia
- A 25-years old lady presents with spontaneous nipple discharge of 3-months duration. On examination the discharge is bloody and from a single duct. The following statements about management of this patient are true except:** (AIIMS Nov 2004)
 - Ultrasound can be a useful investigation
 - Radical duct excision is the operation of choice
 - Galactogram, though useful, is not essential
 - Majority of blood stained nipple discharges are due to papillomas or other benign condition

CARCINOMA BREAST INVESTIGATIONS

- Triple assessment for CA Breast includes:** (Kerala PG 2015)
 - History, clinical examination and mammogram
 - History, clinical examination and FNAC
 - USG, mammogram and FNAC (DNB 2010, All India 2009)
 - Clinical examination, mammogram and FNAC

- Best diagnostic method for breast lump is:** (AIIMS June 95)
 - USG
 - Mammogram
 - Biopsy
 - FNAC
- A 45-years old woman presents with a hard and mobile lump in the breast. Next investigation is:** (All India 2001)
 - FNAC
 - USG
 - Mammography
 - Excision biopsy
- A female patient present with a hard mobile lump in her right breast. Which investigation would be most helpful in making the diagnosis?** (AIIMS Nov 2001)
 - FNAC
 - Needle biopsy
 - Excision biopsy
 - Mammography
- Investigation of choice for High risk breast cancer in female is:** (DNB 2014)
 - MRI
 - CT-PET
 - Mammography
 - USG
- Gold standard investigation for screening of breast carcinoma in patients with breast implant:** (Recent Questions 2015)
 - MRI
 - USG
 - Mammography
 - CT Scan
- A 60-year-old lady comes with blood stained discharge from the nipple with family history of breast cancer. Next best step for her will be:** (AIIMS May 2015).
 - Ductoscopy
 - Sono-mammogram
 - Nipple discharge cytology
 - MRI

MAMMOGRAPHY

- Most sensitive imaging for ductal carcinoma in situ of breast is:** (AIIMS Nov 2010)
 - Mammography
 - MRI
 - PET
 - USG
- True about screening mammography:** (PGI June 2004)
 - Indicated in 50–70 years of age
 - Mortality reduced by 30%
 - Radiation due to mammography can cause carcinoma
 - MRI is better than mammography
 - USG is better than mammography
- On mammogram all of the following are the features of a malignant tumor except:** (AIIMS Nov 2003)
 - Spiculation
 - Microcalcification
 - Macrocalcification
 - Irregular mass

17. **BIRADS stands for:** (AIIMS Nov 2012)
 a. Breast Imaging Reporting and Data System
 b. Best Imaging Reporting and Data System
 c. Brain Imaging Reporting and data system
 d. Best imaging reporting and data system
18. **All are indicators of malignancy in a mammography except:** (PGI Dec 99)
 a. Nodular calcification b. Speckled margin
 c. Attenuated architecture d. Irregular mass
19. **Popcorn calcification in mammography is seen in:** (AIIMS June 2000)
 a. Fibroadenoma
 b. Fat necrosis
 c. Cystosarcoma phyllodes
 d. CA Breast
20. **A 55-years old post menopausal woman, on hormone replacement therapy (HRT), presents with heaviness in both breasts. A screening mammogram reveals a high density speculated mass with cluster of pleomorphic microcalcification and ipsilateral large axillary lymph nodes. The mass described here most likely represents:** (AIIMS Nov 2003)
 a. Cystosarcoma phyllodes b. Lymphoma
 c. Fibroadenoma d. Carcinoma
21. **With reference to mammography, which one of the following statements is correct?** (UPSC 2005)
 a. A baseline study should be done for all women at age 30
 b. It uses less radiation energy than a chest X-ray
 c. It should be part of the regular follow up of a woman following therapy for unilateral breast cancer
 d. It provides an effective substitute for biopsy of suspicious lesions
22. **What is the age of routine screening mammography?**
 a. 20 years b. 30 years (DNB 2014)
 c. 40 years d. 50 years
23. **BIRADS score 5 is:** (Recent Question 2015)
 a. Negative
 b. Probably benign
 c. Suspicious abnormality
 d. Highly suggestive of malignancy
28. **True regarding breast carcinoma is:** (MCI March 2008)
 a. Occurs most commonly in upper inner quadrant
 b. Late menarche and early menopause predisposes for breast malignancy
 c. Commoner in nulliparous women
 d. Unrelated with the family history of breast cancer
29. **All of the following are predisposing factors for breast carcinoma except:** (DNB 2008, MCI Sept 2008)
 a. Family history of breast carcinoma
 b. First child at a younger age
 c. Early menarche and late menopause
 d. Nulliparous women
30. **BRCA-1 positive woman have _____% increased risk of breast carcinoma:** (JIPMER 2011)
 a. 10 b. 20
 c. 40 d. 60
31. **Gail model of risk assessment is used for:** (Recent Questions 2013)
 a. CA stomach b. CA esophagus
 c. CA breast d. CA prostate
32. **Which of the following cancer is least associated with genetic and familial cause?** (DNB 2008)
 a. Ovarian b. Prostate
 c. Lung d. Breast
33. **Breast cancer more commonly seen in:** (PGI Dec 2002)
 a. Increased risk in relatives b. Early marriage <20 years
 c. Nullipara d. High fat diet
 e. Who avoided breast feeding
34. **Least risk of CA breast is seen in:** (AIIMS Nov 2006)
 a. BRCA-1 b. BRCA-2
 c. Li-Fraumeni syndrome d. Ataxia telangiectasia
35. **BRCA-1 gene is associated with:** (DPG 2008)
 a. Ductal carcinoma b. Lobular carcinoma
 c. Medullary carcinoma d. Colloid carcinoma
36. **Type of fibroadenosis most likely to undergo malignant change is:** (AIIMS June 93)
 a. Adenosis b. Epitheliosis
 c. Sclerosing adenosis d. Cystic
37. **Doesn't lead to carcinoma breast:** (DPG 2006)
 a. Sclerosing adenosis b. Epithelial hyperplasia
 c. Fibrocystic change d. Papillomatosis
38. **Which of the following is an increased risk of breast cancer?** (PGI Dec 2005)
 a. Sclerosing adenosis b. Atypical hyperplasia
 c. Fibroadenoma d. Florid hyperplasia
39. **Risks for carcinoma breast are:** (PGI Dec 2000)
 a. First degree relative b. Atypical hyperplasia
 c. Sclerosing adenosis d. Increased fat intake
40. **Breast carcinoma is seen in women who:** (PGI June 2002)
 a. Consume fatty food b. Have early menopause
 c. Smoke d. Have multiple sex-partners
 e. Did not breastfed their children
41. **Breast cancer is more common in:** (PGI Dec 2001)
 a. Those who avoid breast-feeding to the infant
 b. Multiparity
 c. Nulliparity d. High fat diet
 e. Family history of breast cancer
42. **Breast gene is located on which chromosome?** (MHCET 2016)
 a. 11 b. 13
 c. 17 d. 22

CARCINOMA BREAST RISK FACTORS

24. **Risk factor for carcinoma breast:** (PGI Nov 2011, Nov 2010)
 a. Nulliparity b. OCP
 c. Family history d. BRCA-1 mutation
 e. Estrogen
25. **Which of the following is a predisposing factor for carcinoma of breast?** (MHSSMCET 2005)
 a. Sclerosing adenosis
 b. Epithelial hyperplasia
 c. Fibrocystic disease of breast
 d. Fibroadenoma
26. **Following condition has no increased risk of invasive breast carcinoma except:** (MHCET 2016)
 a. Hyperplasia atypical
 b. Sclerosing adenosis
 c. Apocrine metaplasia
 d. Duct ectasia
27. **Moderately increased risk for invasive breast carcinoma is associated with which of the following?** (DNB 2010, Kerala 2000)
 a. Sclerosing adenoma
 b. Apocrine metaplasia
 c. Duct ectasia
 d. Atypical ductal hyperplasia
 e. Fibro adenoma

43. The incidence of carcinoma of the breast is increased in woman who: (AIIMS 78, 84)
- Have an early menarche and late menopause
 - Take an estrogen progestogen oral contraceptive
 - Have their first child after the age of 35 years
 - Avoid breast feeding
 - Are nuns
44. Risk factor for carcinoma breast: (All India 89)
- Fibroadenoma on one side
 - Sister died from cancer
 - Jewish origin
 - All
45. Which one predisposes to breast cancer? (AIIMS 92)
- Adenosis
 - Fibrosis
 - Blue domed cysts
 - Epitheliosis
46. Which of the following is the most significant risk factor for developing breast cancer is? (Karnataka 96)
- The presence of sclerosing adenosis
 - Nulliparity
 - Atypical lobular hyperplasia
 - Atypical ductal hyperplasia
47. Statistically important risk factors identified for breast cancer: (PGI 2002)
- Early age at marriage
 - Females of non vegetarian diet
 - Those who have not breast fed their children
 - Smoking
48. All the following are risk factors for development of carcinoma breast except: (APPG 2016)
- BRCA 1 gene mutation
 - Multiparity & prolonged lactation
 - History of contralateral breast carcinoma
 - Early age of menarche and multiparity
49. All are risk factors for carcinoma breast except: (Recent Questions 2013)
- Early menarche
 - Late menopause
 - Ovarian cancer
 - Early full term pregnancy
50. % of malignancy in duct ectasia is: (Recent Question 2015)
- No risk
 - 15:1
 - 7:1
 - 10:1
56. Most common presentation of lobular carcinoma breast is: (DNB 2012)
- Nipple discharge
 - Breast mass
 - Mammographic calcification
 - Nipple retraction
57. Carcinoma breast is most commonly seen in which quadrant of breast: (MHSSMCET 2005)
- Upper outer
 - Upper inner
 - Lower inner
 - Lower outer
58. Nottingham Prognostic Index for CA breast is: (MHSSMCET 2008)
- $I = (0.2 \times \text{size}) + \text{grade} + \text{nodes}$
 - $I = (0.4 \times \text{size}) + \text{grade} + \text{nodes}$
 - $I = (0.6 \times \text{size}) + \text{grade} + \text{nodes}$
 - $I = (0.8 \times \text{size}) + \text{grade} + \text{nodes}$
59. Rare histological variants of carcinoma breast with better prognosis include all except: (DPG 2009 March)
- Colloid carcinoma
 - Medullary carcinoma
 - Inflammatory carcinoma
 - Tubular carcinoma
60. All of the following are invasive carcinoma breast except: (PGI 89)
- Comedocarcinoma
 - Colloid carcinoma
 - Lobular carcinoma in-situ
 - Medullary carcinoma
61. Which carcinoma breast is not invasive? (DPG 79,93)
- Comedocarcinoma
 - Schirrhous carcinoma
 - Lobular carcinoma
 - Paget's disease
62. In which of the following types of carcinoma breast, comedo growth pattern is seen? (Karnataka 2006)
- Ductal carcinoma in-situ
 - Medullary carcinoma
 - Lobular carcinoma in-situ
 - Infiltrating lobular carcinoma
63. Histological variety of breast carcinoma with best prognosis is: (DNB 2012, 2008, 2005, 2002)
- Medullary
 - Colloid
 - Lobular
 - Tubular
64. Breast cancer which is multicentric and bilateral? (DPG 2008, AIIMS Feb 97, May 95, All India 96, PGI June 95)
- Ductal carcinoma
 - Lobular carcinoma
 - Mucoid carcinoma
 - Colloid carcinoma
65. Single file pattern is seen breast cancer type: (APPG 2004)
- Intraductal
 - Infiltrating lobular
 - Infiltrating ductular
 - None
66. In which of the following type of carcinoma of the breast, is a biopsy of the opposite breast advised? (UPSC 2002)
- Inflammatory carcinoma
 - Medullary carcinoma
 - Lobular carcinoma
 - Scirrhous carcinoma
67. In which of the following type of breast carcinoma, would you consider biopsy of opposite breast? (All India 2006)
- Adenocarcinoma poorly differentiated
 - Medullary carcinoma
 - Lobular carcinoma
 - Comedo carcinoma
68. The type of mammary ductal carcinoma is situ (DCIS) most likely to result in a palpable abnormality in the breast is: (All India 2006)
- Apocrine DCIS
 - Neuroendocrine DCIS
 - Well differentiated DCIS
 - Comedo DCIS
69. Not true about CA breast in India: (AIIMS June 98)
- Incidence is 20/1,00,000
 - Average age 42 years
 - Positive family history is a risk factor
 - More common in muslims

CARCINOMA BREAST

51. In which of the following types of carcinoma breast, comedo growth pattern is seen?
- Ductal carcinoma in-situ
 - Medullary carcinoma
 - Lobular carcinoma in-situ
 - Infiltrating lobular carcinoma
52. False about lobular carcinoma breast is: (DNB 2008)
- Present as breast mass
 - Frequently bilateral
 - Poor prognosis
 - Multicentric
53. True about histology in infiltrating lobular breast carcinoma: (JIPMER 2012, 2011)
- Single file pattern
 - Pleomorphic cells in sheets
 - Cribiform pattern
 - Pin wheel pattern
54. Lymph node first involved in CA breast is/are: (PGI Nov 2009)
- Axillary LN
 - Internal mammary LN
 - Supraclavicular LN
 - Contralateral axillary LN
55. In breast cancer following are expressed: (PGI Dec 2007)
- Her-2-neu
 - p53
 - BRCA-1
 - BCL-1
 - CEA

70. **Best prognosis amongst the following histological variants of breast carcinoma is seen with:** (All India 98)
 a. Intraductal b. Colloid (Mucinous)
 c. Lobular d. Medullary
71. **Which of the following carcinoma is familial?** (All India 99)
 a. Breast b. Prostate
 c. Cervix d. Vaginal
72. **Which one of the following familial carrier syndromes is associated with mutation in BRCA genes?** (APPG 2016)
 a. Hereditary non-polyposis colorectal cancer
 b. Von Hippel Lindau disease
 c. Peutz-Jegher syndrome
 d. Familial breast/ovarian cancer
73. **Group of lymph node involved in breast carcinoma are all of the following except:** (MCI March 2005)
 a. Supraclavicular b. Pretracheal
 c. Axillary d. Internal mammary
74. **True about breast carcinoma are all except:**
 a. Positive family history (MCI March 2007)
 b. Median age of presentation is about 40 years
 c. More common in muslims
 d. Peau d'orange is due to subcutaneous lymphatic involvement
75. **'Peau-d'orange' appearance of the mammary skin is due to:** (DNB 2012, PGI June 95, Dec 95)
 a. Intra-epithelial cancer b. Sub-epidermal cancer
 c. Lymphatic permeation d. Vascular embolisation
76. **'Peau-d'orange' is seen in:** (PGI 88)
 a. Carcinoma breast b. Fibroadenoma
 c. Chronic abscess d. Mondor's disease
77. **Most common site of metastasis from breast carcinoma:** (DNB 2012)
 a. Thoracic vertebra b. Pelvis
 c. Femur d. Lumbar vertebra
78. **Carcinoma breast with high incidence of involving opposite breast is:** (AIIMS Nov 94)
 a. Lobular carcinoma
 b. Medullary carcinoma
 c. Scirrhous adenocarcinoma
 d. Atrophic scirrhous carcinoma
79. **All are true about CA breast, except:** (AIIMS May 93)
 a. Affected sibling is a risk factor
 b. Paget's disease of nipple is intraductal type of CA
 c. Common in aged nulliparous
 d. Increased incidence with prolonged breast feeding
80. **Which of the following indicate CA breast?** (PGI Dec 2002)
 a. Serous discharge
 b. Recent retraction of nipple
 c. Ulceration of nipple
 d. Cracked nipple
 e. Cellular atypia
81. **'Peau-d'orange' is due to:** (DNB 2009, 2008, AIIMS Nov 93)
 a. Arterial obstruction (AIIMS November 2015)
 b. Blockage of subdermal lymphatics
 c. Invasion of skin with malignant cells
 d. Secondary infection
82. **'Peau-d'orange' of breast is due to:**
 a. Obstruction of Vein (MCI Sept 2005, 2010, March 2007)
 b. Obstruction of lymphatic ducts
 c. Obstruction of glandular ducts
 d. Obstruction of arteries
83. **True about lymphatic spread of CA Breast:** (PGI June 2005)
 a. Axillary nodes are most commonly involved
 b. Internal mammary nodes are also involved
 c. If supraclavicular lymph node is involved then it is N3
 d. Axillary nodes are treated by surgical resection
84. **Secondary deposits from carcinoma breast is commonest in:** (DNB 2010, 2001, All India 89)
 a. Lung b. Liver
 c. Brain d. Bone
85. **Most common type of breast carcinoma:** (WBPG 2014-15)
 a. LCIS b. DCIS
 c. Phyllodes tumour d. Invasive ductal carcinoma
86. **Carcinoma breast is least commonly seen in:** (Recent Questions 2013)
 a. Superior outer quadrant
 b. Inferior outer quadrant
 c. Subareolar
 d. Lower inner quadrant
87. **Nipple inversion occurs due to involvement of:** (DNB 2014)
 a. Cooper's ligament
 b. Subareolar duct
 c. Parenchyma of breast
 d. Subdermal lymphatics
88. **Van Nuys grading system is used for:** (DNB 2014)
 a. LCIS
 b. DCIS
 c. Inflammatory
 d. Medullary Carcinoma breast
89. **Which of the following statements is fully true?**
 a. Paget's disease of the nipple is a type of breast cancer with prominent Paget cells and presence of S-100 Ag immunostaining (APPG 2015)
 b. BRCA 1 and 2 gene mutations cause breast cancer and are passed from mother to daughter by mitochondrial inheritance
 c. Raloxifene is a SERM that prevents breast cancer but increases risk of endometrial cancer
 d. Lobular carcinoma in situ arises from epithelial lining of the minor ducts and 10% occur in males

CARCINOMA BREAST STAGING

90. **A 45-years old postmenopausal lady presents with an 8-cm breast lump that is adherent to the skin, with one firm apical lymph node in the axilla and one more node in the ipsilateral supraclavicular area with no clinical evidence of distant metastasis. The staging is:** (COMEDK 2010)
 a. T3 N2 M1 b. T4 N3c M0
 c. T4 N2c M1 d. T3 N3 M0
91. **In patients with breast cancer, chest wall involvement means involvement of any one of the following structures except:** (DPG 2010, AIIMS Nov 2005)
 a. Serratus anterior b. Pectoralis major
 c. Intercostal muscles d. Ribs
92. **Ipsilateral supraclavicular lymph nodes are positive in a patient of CA breast. Stage is:** (Recent Question 2013, AIIMS Nov 2008)
 a. II b. III B
 c. III C d. IV

115. A 50-years old female has undergone mastectomy for CA breast. After mastectomy patient is not able to extend adduct and internally rotate the arm. Now supply to which of the following muscle is damaged? (AIIMS May 2012)
- Pectoralis major
 - Teres minor
 - Lattissimus dorsi
 - Long head of triceps
116. In Patey's mastectomy, the step not done is: (PGI 95)
- Nipple and areola removed
 - Surrounding normal tissue of tumor is removed
 - Pectoralis major removed
 - Pectoralis minor removed
117. Which is used in CA Breast? (DPG 2007)
- Daunorubicin
 - Doxorubicin
 - Cisplatin
 - Actinomycin D
118. Malti, a 45-years female patient with a family history of breast carcinoma, showed diffuse microcalcification on mammography. Intraductal carcinoma in situ was seen on biopsy. Most appropriate management is: (NEET 2013) (AIIMS June 2001)
- Quadrantectomy
 - Radical mastectomy
 - Simple mastectomy
 - Chemotherapy
119. CA Breast stage I and II managed by: (PGI Dec 2002)
- Total mastectomy
 - Modified radical mastectomy
 - Lumpectomy and axillary clearance
 - Lumpectomy, axillary clearance and radiotherapy
120. For CA breast best chemotherapeutic regimen:
- Cyclophosphamide, methotrexate, 5-fluorouracil
 - Methotrexate, cisplatin (AIIMS Sept 96, PGI June 96)
 - Cisplatin, adriamycin, steroid
 - Methotrexate, adriamycin, steroid
121. A 30-years old female presented with unilateral breast cancer associated with axillary lymph node enlargement. Modified radical mastectomy was done, further treatment plan will be: (AIIMS May 2007)
- Observation and follow-up
 - Adriamycin based chemotherapy followed by tamoxifen depending on estrogen/progesterone receptor status
 - Adriamycin based chemotherapy only
 - Tamoxifen only
122. True about adjuvant therapy in breast cancer:
- Prognosis is better, if given in young female
 - Increases survival by 20% (PGI Dec 2003)
 - Nodal status positive gives good result
 - Hormone receptor positive gives good result
 - Not associated with increased survival
123. Conservative surgery in breast cancer is not to be done in:
- Low socio-economic status (PGI Dec 2002)
 - Age >40 years
 - Multicentricity
 - Lymph nodes involvement in axilla
 - Family history of breast cancer
124. Breast conservative surgery is done in all except: (DPG 2010, UPPG 2000)
- Young patients
 - Ductal carcinoma in situ
 - Lobular carcinoma
 - Infiltrative ductal carcinoma
125. Breast conservation surgery is not indicated in:
- Large pendular breast
 - SLE (PGI Dec 2005)
 - Diffuse microcalcification
 - Bilateral carcinoma
 - Family history
126. Absolute contraindication of conservative breast cancer therapy is: (PGI Dec 2005)
- Large pendulous breast
 - History of previous radiation
 - Axillary node involvement
 - Subareolar lump present
 - 1st trimester pregnancy
127. In breast conservation surgery, the healthy margin excised is typically: (DNB 2013)
- 1 cm
 - 2 cm
 - 3 cm
 - 5 cm
128. In the breast conservation surgery, which of the following investigation is required: (DNB 2002)
- Serum calcium
 - Total body scan
 - Sentinel node biopsy
 - Tumor markers
129. Post operative radiotherapy in breast is given for:
- To prevent metastasis (JIPMER 95)
 - For ablation of remnant of cancer tissue
 - To prevent recurrence
 - Prevents distant metastasis
130. A 40-years old female with a 2 cms nodule in the breast and a proved metastatic node in the axilla, treatment is:
- Quadrantectomy (PGI 96)
 - Mastectomy with local radiotherapy
 - Patey's with adjuvant chemotherapy
 - Halsted's operation with tamoxifen
131. Treatment of hormone dependent fungating carcinoma of breast with secondaries in the lung in a female patient aged 30 years is: (MAHE 2005)
- Simple mastectomy followed by oophorectomy
 - Radical mastectomy followed by oophorectomy
 - Adrenalectomy
 - Lumpectomy followed by castration
132. A premenopausal lady presents with pulmonary metastasis. She underwent mastectomy 3 years back. True statement regarding her management: (PGI Nov 2011)
- It was better if she took adjuvant therapy after mastectomy
 - First analyze estrogen and progesterone receptor levels on the tumor
 - Response of chemotherapy is dose dependent
 - Combined chemotherapy is better than monotherapy
 - She should now be given chemotherapy with radiotherapy
133. Aromatase inhibitors used in CA breast are: (PGI June 2007)
- Letrozole
 - Anastrozole
 - Exemestane
 - Tamoxifen
134. According to NSABP tamoxifen given in breast carcinoma for: (WBPG 2014)
- 5 years
 - 3 years
 - 10 years
 - Lifelong
135. In radical mastectomy, the structures preserved are all except: (Recent Question 2015)
- Axillary vein
 - Cephalic vein
 - Nerve to Serratus anterior
 - Pectoralis minor

CARCINOMA BREAST PROGNOSTIC INDICATORS

136. The most important prognostic factor of carcinoma breast is: (COMEDK 2010)

- a. Tumour size
- b. DNA content of tumour
- c. Histologic subtype
- d. Tumour grade

137. Good prognostic markers in breast cancer: (PGI Dec 2006)

- a. ER +ve
- b. PR +ve
- c. HER-2-neu +ve
- d. CD44 +ve
- e. p53 +ve

138. Not a poor prognostic factor in breast carcinoma:

- a. Her-2-neu +ve (PGI May 2011)
- b. Progesterone receptor +ve
- c. Extranodal metastasis
- d. Vascularity of tumor
- e. ER +ve

139. Good prognosis in carcinoma breast are all except:

- a. Positive estrogen progesterone hormone receptor
- b. High HER-2-neu oncogene (UPPG 2010)
- c. DNA flow cytometry shows-diploidy
- d. Low cathepsin-D
- e. Tumour labeling index <3%

140. The most important prognostic factor in carcinoma breast is: (DPG 2009 Feb)

- a. Size of tumour
- b. Skin involvement
- c. Involvement of muscles
- d. Axillary LN involvement

141. Prognosis of breast cancer is best determined by:

- a. Estrogen/progesterone receptors (APPG 2008)
- b. Axillary lymph node status
- c. Clinical assessment
- d. CT

142. Most unfavorable/poor prognosis is seen in which type of breast cancer? (MCI Sept 2007)

- a. Tubular carcinoma
- b. Medullary carcinoma
- c. Colloid carcinoma
- d. Inflammatory carcinoma

143. In case of CA breast most important prognostic factor is:

- a. Size of tumor (WB PG 2015, AIIMS Nov 96, Feb 97)
- b. Lymph node status
- c. Presence of estrogen receptor
- d. Age of menopause

144. The risk factor for increased incidence of relapse in stage I carcinoma breast includes all except:

- a. Negative estrogen/progesterone receptor status
- b. High 'S' phase (All India 98)
- c. Aneuploidy
- d. Decreased Her-2-neu oncogene

145. In breast cancer following are expressed: (PGI Dec 2007)

- a. Her-2-neu
- b. p53
- c. BRCA-1
- d. BCL-1
- e. CEA

146. Features, which are evaluated for histological grading of breast carcinoma, include all of the following except: (AIIMS Nov 2005)

- a. Tumour necrosis
- b. Mitotic count
- c. Tubule formation
- d. Nuclear pleomorphism

147. The most important prognostic factor in breast carcinoma is:

- a. Histological grade of the tumour (All India 2006)
- b. Stage of the tumour at the time of diagnosis
- c. Status of estrogen and progesterone receptors
- d. Over expression of p53 tumor suppressor gene

148. Molecular classification of breast cancer is based on:

(AIIMS November 2014)

- a. Serum hormone levels
- b. Expression of hormone receptors (ER/PR)
- c. In-vitro response to chemotherapeutic agents
- d. Gene expression profiling

149. Estrogen receptor studies in carcinoma breast is done on:

(JIPMER 87)

- a. Blood
- b. Urine
- c. Tumour tissue
- d. Ovary

150. Oncotype Dx test is done to for the following in breast cancer: (AIIMS May 2015)

- a. Chemotherapy in hormone receptor positive patients
- b. Hormone therapy in hormone positive
- c. Chemotherapy in hormone receptor negative patients
- d. Herceptin in Her-2-neu +ve

COMPLICATIONS OF MASTECTOMY

151. Distressing complication after modified radical mastectomy?

(Kerala PG 2015, APPG 2008, Orissa 90)

- a. Lymphedema
- b. Axillary vein thrombosis
- c. Seroma
- d. Death

152. The tumour, which may occur in the residual breast or overlying skin following wide local excision and radiotherapy for mammary carcinoma is: (All India 2004)

- a. Leiomyosarcoma
- b. Squamous cell carcinoma
- c. Basal cell carcinoma
- d. Angiosarcoma

153. Complication of post mastectomy lymphedema is:

- a. Metastases of cancer
- b. Recurrence (JIPMER 95)
- c. Lymphosarcoma
- d. Pain

154. Pain along medial aspect of arm in a post-mastectomy patient is due to: (DNB 2009, 2008)

- a. Phantom breast pain
- b. Intercostobrachial neuralgia
- c. Neuroma pain
- d. Other nerve injury pain

BREAST RECONSTRUCTION

155. Reconstruction surgery in breast carcinoma, best myocutaneous flap is: (UPPG 2009)

- a. Pectoralis minor
- b. Pectoralis major
- c. Latissimus dorsi
- d. Transverse rectus abdominis

156. Flap commonly used in breast reconstruction is:

(Recent Questions 2014)

- a. Serratus anterior
- b. TRAM
- c. Flap from arm
- d. Delto pectoral flap

157. All of the following are used for reconstruction of breast except: (AIIMS Nov 2000)

- Transverse rectus abdominis myocutaneous flap
- Latissimus dorsi myocutaneous flap
- Pectoralis major myocutaneous flap
- Transversus rectus abdominis free flap

158. Which of the following flaps gives best cosmetic results for breast reconstruction? (MHPGMCET 2008)

- Pectoralis major muscle flap
- Latissimus dorsi flap
- Transversus rectus abdominis muscle flap
- Serratus anterior muscle flap

INFLAMMATORY CARCINOMA BREAST

159. Most malignant type of carcinoma breast is:

- Paget's disease (NIMHANS 86, JIPMER 87)
- Anaplastic carcinoma
- Scirrhus carcinoma
- Atrophic Scirrhus carcinoma
- Mastitis carcinomatosa

160. In inflammatory carcinoma breast with metastasis of axilla, treatment of choice is: (PGI Dec 96)

- Radical mastectomy + chemotherapy
- Radical mastectomy + radiotherapy
- Simple mastectomy + radiotherapy
- Chemotherapy + radiotherapy

MALE BREAST CANCER

161. True about breast carcinoma in men:

- Estrogen receptor positive (NIMHANS 86, JIPMER 87)
- Associated with gynecomastia
- Radiotherapy contraindicated due to close proximity to chest wall
- Seen in young males

162. What is true about male breast carcinoma? (DPG 2008)

- Gynecomastia is a predisposing factor
- More common on right side
- Tamoxifen is not given
- No estrogen present

163. True regarding male breast cancer: (PGI June 2009)

- MC lobular type
- Estrogen receptor positive
- History of gynecomastia may be present
- Paget's disease of nipple is more common in male than female
- Undescended testis is a risk factor

164. True about male breast cancer is all except:

- Less than 2% of all cases of breast cancer
- Most commonly it is infiltrating duct carcinoma
- Most commonly it is infiltrating lobular carcinoma
- Exocrine or endocrine estrogen exposure can predispose to it

165. True about male breast cancer: (Recent Question 2014)

- Invasive lobular carcinoma is most common type
- ER is negative
- Seen in young males
- BRCA-2 Mutation is associated with increased risk

166. Most common carcinoma breast in male is:

(Recent Questions 2014)

- LCIS
- DCIS
- Invasive ductal cancer
- Invasive lobular cancer

CARCINOMA BREAST IN PREGNANCY

167. True about breast cancer in pregnancy:

- Occurs in 1 of every 3000 pregnant women
- MC non-gynecologic malignancy associated with pregnancy
- Ductal carcinoma is MC type, accounting for 75-90% of breast cancer in pregnancy
- All of the above

MONDOR'S DISEASE

168. Mondor's disease is:

(Recent Question 2015, 2014)

- Thrombophlebitis of the superficial veins of breast
- Carcinoma of the breast (DNB 2014, All India 96)
- Premalignant condition of the breast
- Filariasis of the breast

169. About Mondor's disease:

(PGI Dec 2006, Dec 2002)

- Superficial thrombophlebitis
- Lymphatic infiltration tumour cell
- Cord like appearance of subcutaneous veins
- Occurs all over the body

170. Mondor's disease is superficial thrombophlebitis of:

(COMEDK 2005)

- Axillary vein
- Long saphenous vein
- Veins of the breast
- Internal mammary vein

DUCTAL ANOMALIES

171. Treatment of choice in duct papilloma of breast is:

(Kerala PG 2015, All India 98, All India 96)

- Simple mastectomy
- Microdochectomy
- Local wide excision
- Chemotherapy

172. Treatment for duct ectasia:

- Hadfield's operation (Recent Questions 2014, MAHE 2008)
- Patey's mastectomy
- Modified radical mastectomy
- Radical mastectomy

173. Slit shaped nipple is seen in:

(Recent Question 2015)

- Duct ectasia
- Duct papilloma
- Paget's disease
- CA breast

174. A woman noticed mass in her left breast with bloody discharge. Histopathology revealed duct ectasia. Treatment is:

(AIIMS Nov 2008)

- Simple mastectomy
- Microdochotomy
- Lobectomy
- Hadfield operation

175. Sign seen in large duct papilloma is:

(DNB 2012)

- Nipple discharge
- Breast mass
- Skin excoriation
- Lymphnode involvement

CYSTOSARCOMA PHYLLODES

176. Treatment of cystosarcoma phyllodes in a young woman: (JIPMER 2011)
 a. Wide excision with a margin
 b. Wide excision with chemotherapy
 c. Wide excision with radiotherapy
 d. MRM
177. Cystosarcoma phyllodes is treated by:
 a. Simple mastectomy (Recent Question 2015, AIIMS May 93)
 b. Radical mastectomy
 c. Modified radical mastectomy
 d. Antibiotic with conservative treatment
178. Which one of the following statements is true of cystosarcoma phyllodes? (UPSC 96)
 a. It is a malignant tumour
 b. It often metastasizes to axillary nodes
 c. It is usually bulky and may fungate through the skin
 d. It is treated by radical mastectomy
179. A mobile, variegated large lump in the breast of a 20-years old female is most likely to be due to: (UPSC 97)
 a. Medullary carcinoma
 b. Inflammatory carcinoma
 c. Cystosarcoma phyllodes
 d. Lobular carcinoma
180. True about cystosarcoma phyllodes is: (DNB 2007)
 a. Calcification
 b. Cystic component
 c. Tendency to recur
 d. All of the above
181. Most common sarcoma of breast: (Recent Question 2015)
 a. Angiosarcoma
 b. Phyllodes tumor
 c. Kaposi sarcoma
 d. None

GYNECOMASTIA

182. Gynecomastia may be seen in all of the following conditions except: (All India 98)
 a. Klinefelter's syndrome
 b. Cirrhosis of liver
 c. Cryptorchidism
 d. Sex-cord tumour of sertoli cells
183. All of the following statements about gynecomastia are true except: (All India 2007)
 a. Subcutaneous mastectomy is the initial treatment of choice
 b. Seen in liver disease
 c. There may be estrogen/testosterone imbalance
 d. Can be drug induced
184. All are true regarding gynaecomastia except: (AIIMS Nov 93)
 a. May be seen in Addison's disease
 b. Usually unilateral in young males
 c. Acini are not involved
 d. Bilaterality is due to endocrinopathy
185. Gynaecomastia may be seen in patient with all except: (UPSC 88)
 a. Cimetidine therapy
 b. Cirrhosis of liver
 c. Klinefelter's syndrome
 d. Turner's syndrome
186. An adolescent boy presents with bilateral prominence of breasts and wants the breasts to be removed. Which one of the following incisions would be ideal? (UPSC 97)
 a. Radial
 b. Incision along the areolar margin

- c. Submammary incision
 d. Elliptical incision

187. Which of the following is least likely to be associated with gynecomastia? (All India 2012)
 a. Prolactinoma
 b. Adrenal tumors
 c. hCG secreting tumors
 d. Estrogen secreting tumors

PAGET'S DISEASE OF NIPPLE

188. Paget's disease of breast, true statements are: (PGI Nov 2009)
 a. Intraductal carcinoma
 b. Mastectomy needed
 c. Malignant
 d. Bilateral
189. Consider the following statements regarding Paget's disease of the breast: (UPSC 2008)
 1. It is a malignant disease
 2. Diagnosis can be established by scrape cytology
 3. Lymph nodes involvement is an associated clinical feature
 4. Treatment of choice is simple mastectomy
 Which of the statements given above is/are correct?
 a. 1, 2 and 4 only
 b. 1, 2 and 3 only
 c. 3 and 4 only
 d. 1, 2, 3 and 4
190. Paget's disease: (DPG 2006)
 a. Incidence is 1:1000
 b. Has underlying intralobular carcinoma
 c. May have underlying carcinoma
 d. Blood stained discharge
191. Primarily a disease of nipple and areola: (DNB 2007)
 a. Duct papilloma
 b. Paget's disease
 c. Periductal mastitis
 d. Fibroadenoma
192. Paget's disease of breast following are true except: (PGI Dec 97)
 a. Treated by simple mastectomy
 b. Represents underlying malignancy
 c. Presents as eczema
 d. Cytology diagnostic (Recent Question 2015)
193. Characteristic feature of Paget's cell is: (Kerala 94)
 a. Eosinophilic cytoplasm
 b. Abundant clear cytoplasm
 c. Glycogen mass
 d. Multinucleated giant cell
194. True about Paget's disease of the nipple is: (Kerala 95)
 a. Always there is underlying carcinoma
 b. Often bilateral eczema of nipple seen
 c. Histology reveals giant cells
 d. Highly malignant
195. All are true about Paget disease of breast except: (DNB 2014)
 a. 1% associated with underlying invasive carcinoma of breast
 b. Hormone receptor negative
 c. Poor prognosis
 d. Wedge or punch is biopsy taken from nipple for diagnosis
196. Following are true of Paget's disease of breast except: (Karnataka 98)
 a. Usually bilateral
 b. Associated intraductal carcinoma
 c. Prognosis good in absence of lump
 d. Treatment simple mastectomy with axillary clearance
197. Which is not having underlying malignancy? (APPG 2008)
 a. Paget disease of bone
 b. Paget disease of nipple
 c. Paget disease of vulva
 d. Paget disease of anal region

MASTITIS AND BREAST ABSCESS

198. **Retromammary abscess arises from:** (JIPMER 86, 87, Kerala 87)
 a. Tuberculous rib b. Infected hematoma
 c. Chronic empyema d. All of the above
199. **Acute mastitis commonly occurs during:** (DNB 2000, UPSC 86, JIPMER 88)
 a. Pregnancy b. Puberty
 c. Lactation d. Infancy
200. **A lactating female presented with breast abscess. Most common organism responsible for her mastitis and abscess formation is:** (Recent Question 2014, Punjab 2011)
 a. *S. aureus* b. *E. coli*
 c. Streptococci d. Anaerobes

ANDI FIBROADENOMA AND FIBROADENOSIS

201. **Fibroadenoma of the breast are:** (TN 89)
 a. Fixed mass b. Diffuse mass
 c. Multiple diffuse mass d. Solitary mobile mass
202. **Pre-menstrual fullness in breast in 21-years old unmarried female is:** (AIIMS 98)
 a. Galactocele b. Fibroadenoma
 c. Fibroadenosis d. Breast cancer
203. **Regarding cystic disease of breast, which one is true?** (AIIMS Nov 97)
 a. Common in 25 years of age
 b. Excision is the treatment
 c. May turn into malignant
 d. Aspiration is the treatment
204. **The following are suitable for simple mastectomy except:** (Recent Questions 2013)
 a. Paget's disease
 b. Fibroadenoma
 c. Cystosarcoma phyllodes
 d. None
205. **A 17-year-old female underwent Fine Needle Aspiration cytology (FNAC) for a lump in the breast which was non-tender, firm and mobile. Which of the following features would suggest finding of a benign breast disease?** (AIIMS November 2014, May 2013)
 a. Dyscohesive ductal epithelial cells without cellular fragments
 b. Tightly arranged ductal epithelial cells with dyscohesive bare nuclei
 c. Stromal predominance with spindle cells
 d. Polymorphism with single or arranged ductal epithelial cells

MISCELLANEOUS

206. **Cracked nipple may be:** (AIIMS 84)
 a. Due to syphilitic chancre
 b. Cause of retention cyst
 c. Paget's disease of nipple
 d. Forerunner of breast abscess
207. **Lymphatic drainage of breast:** (PGI Dec 2003)
 a. Axillary
 b. Supraclavicular
 c. Internal mammary
 d. Mediastinal
 e. Celiac
208. **Breast examination is done yearly in patients with:** (PGI 88)
 a. Multiple fibroadenoma
 b. Family history of CA breast
 c. Carcinoma cervix
 d. Endometrial carcinoma
209. **A 50-years old woman complains of intermittent bleeding from the left nipple over the past 3 months. No mass is palpable, but a bead of blood can be expressed from the nipple. The ideal procedure in this case would be:** (UPSC 97)
 a. Cytological examination of discharge and if no malignant cells, to be kept under careful observation
 b. Segmental excision of breast
 c. Microdochotomy
 d. Simple mastectomy
210. **Tylectomy literally means:** (DNB 91)
 a. Excision of a lump b. Excision of LN
 c. Excision of breast d. Excision of skin
211. **True about galactorrhoea:** (PGI Dec 2008)
 a. Always bilateral
 b. Found in pregnancy and lactation
 c. Associated with prolactinoma and other endocrinopathies
 d. Surgery is done
 e. Hypothyroidism can cause galactorrhoea
212. **Large breast is not seen in:** (AIIMS Dec 95)
 a. Filariasis b. Giant fibroadenoma
 c. Cystosarcoma phyllodes d. Schirrhous carcinoma
213. **A 14-years old healthy girl of normal height and weight for age, complains that her right breast has developed twice the size of her left breast since the onset of puberty at the age of 12. Both breasts have a similar consistency on palpation with normal nipples areolae. The most likely cause for these findings is:** (AIIMS Nov 2003)
 a. Cystosarcoma phyllodes
 b. Virginal hypertrophy
 c. Fibrocystic disease
 d. Early state of carcinoma
214. **Haagensen's sign of inoperability of carcinoma include all except:** (DNB 91)
 a. Edema of skin of breast or arm
 b. Satellite tumor nodules in skin of breast
 c. Proved supraclavicular or distant metastases
 d. Parasternal tumor growth
 e. None of the above
215. **Unilateral amastia is associated 90% of the time with absence or hypoplasia of following muscle:** (COMEDK 2004)
 a. Latissimus dorsi
 b. Subclavian
 c. Pectoral
 d. Serratus anterior
216. **True about leiomyosarcoma breast:** (PGI Nov 2010)
 a. Axillary lymph node dissection is mandatory
 b. Well encapsulated
 c. Follow up not required
 d. Mastectomy is mainstay treatment
 e. Metastasize by lymphatic channel
217. **Most frequent site of accessory breast:** (Orissa 2011)
 a. Axilla b. Groin
 c. Buttock d. Thigh

218. Zuska's disease common in smokers causes:

- a. Acute mastitis (DNB 2012, 2007)
- b. Chronic areolar abscess
- c. Fibroadenosis
- d. Acute abscess formation

219. Lymphatic from left upper quadrant of breast drains into all of the following group of lymph nodes except: (DNB 2001)

- a. Anterior axillary
- b. Central
- c. Apical
- d. Parasternal

220. A lady 35 years old lactating mother presented with a painful breast lump. Most appropriate initial investigation should be: (AIIMS Nov 2012)

- a. Mammography
- b. USG
- c. MRI
- d. X-ray

221. In sentinel node biopsy for breast cancer, the most commonly injured nerve is: (AIIMS May 2013)

- a. Lateral pectoral nerve
- b. Nerve to latissimus dorsi
- c. Intercostobrachial nerve
- d. Long thoracic nerve (Nerve to serratus anterior)

222. Intraoperative sentinel lymph node detection in axilla is done by using: (Recent Question 2013)

- a. Mammography
- b. Isosulfan blue dye
- c. MRI
- d. CT

223. Sentinel lymph node biopsy in carcinoma breast is done if: (Recent Question 2013)

- a. LN palpable
- b. Breast mass but no lymph node palpable
- c. Breast lump with palpable axillary node
- d. Metastatic CA breast

EXPLANATIONS

NIPPLE DISCHARGE

1. Ans. c. Ductal papilloma (Ref: Schwartz 10/e p554, 9/e p467; Sabiston 19/e p828; Bailey 26/e p802, 25/e p831)

Nipple Discharge	
Colour	Cause
Blood-stained	<ul style="list-style-type: none"> Duct Papilloma^Q Intraductal carcinoma^Q Duct ectasia^Q
Serous	<ul style="list-style-type: none"> Fibrocystic disease^Q Duct ectasia^Q Carcinoma^Q
Black, green, paste like or grumous discharge	<ul style="list-style-type: none"> Duct ectasia^Q

- MC cause of greenish discharge: Duct ectasia^Q
 - MC cause of blood-stained discharge: Duct papilloma^Q
2. Ans. b. Duct ectasia, c. Ductal papilloma, e. CA breast
3. Ans. b. Duct ectasia.
4. Ans. b. Microdochectomy (Ref: Bailey 26/e p802, 25/e p831; CSDT 12/e p299; Schwartz 10/e p526, 9/e p448)

NIPPLE DISCHARGE

- Unilateral, spontaneous, serous or serosanguinous discharge from a single duct is usually caused by an intraductal papilloma^Q, or rarely by an intraductal cancer.
- Mostly the underlying cause is a duct papilloma or duct ectasia^Q, but since the chances of malignancy are high, it must be investigated further.
- Risk of malignancy increases if an underlying mass^Q is present.^Q

Investigations

- Mammography: Can show underlying suspicious lesions
- Cytological examination: (may identify malignant cells, but a negative finding doesn't rule out cancer)

Ductography

- Primary indication: Nipple discharge^Q (particularly when the fluid contains blood)
- Radiopaque contrast media is injected into one or more of the major ducts and mammography is performed
- Intraductal papillomas: Small filling defects^Q surrounded by contrast media
- Cancers: Irregular masses or as multiple intraluminal filling defects^Q
- Duct Ectasia: Dilated cystic structure^Q

- Ultrasound: May show presence of an underlying mass or duct ectasia

Final Diagnosis

- Final diagnosis is made by excising the involved duct (Microdochectomy)^Q and any underlying mass if present and subjecting then for a histopathological diagnosis.
- Radical duct excision (removal of all lactiferous ducts) is not done^Q.

Treatment

- Firstly exclude a carcinoma by occult blood test and cytology.
- Simple reassurance may then be sufficient but, if the discharge is proving intolerable, an operation to remove the affected duct or ducts can be performed (microdochectomy).

5. Ans. a. Mammography, b. Cone excision done in single intraductal tumour, d. Red discharge indicate malignancy, e. Blue-black discharge indicate duct ectasia
6. Ans. b. Radical duct excision is the operation of choice.

CARCINOMA BREAST INVESTIGATIONS

7. Ans. d. Clinical examination, Mammogram and FNAC (Ref: Schwartz 10/e p522-523, 9/e p444-446; Sabiston 19/e p840-842; Bailey 26/e p799-801, 25/e p829-832)

- **Triple Assessment** includes a combination of **clinical assessment**, **radiological imaging** (USG/ Mammography) and **tissue sample analysis** (FNAC/Biopsy)^Q
- The **positive predictive value** of Triple Assessment should exceed **99.9%**^Q

BREAST CANCER

- MC cancer in women in the world^Q and MC cancer in urban^Q women in India
- MC type is **adenocarcinoma**^Q and most carcinoma arises from **terminal duct lobular unit**^Q
- MC type of CA breast: **Invasive ductal** (schirrous) **carcinoma**^Q
 - Most malignant type of CA breast: **Inflammatory breast cancer**^Q
 - MC site of CA breast: **Upper outer quadrant**^Q (left^Q breast >right)
 - MC site of metastasis is **Bone**^Q (**Osteolytic deposits in Lumbar vertebra >Femur >Thoracic vertebra >Rib >Skull**)
- Metastatic disease (**Malignant pleural effusion**^Q) is the **principal cause of death** from breast cancer.
- 2nd MC cause of cancer related death in women^Q (MC is CA lung in both males and females)^Q

Clinical Features

- Early breast cancer may be asymptomatic^Q

Symptoms indicating possibility of breast cancer

- **Change in size or shape** of breast^Q
- **Skin dimpling, nipple retraction**^Q
- **Single duct discharge**, particularly **blood stained**^Q
- **Axillary node enlargement**^Q

- Symptoms indicating possibility of **Metastasis**:
 - **Breathing difficulty, bone pain**, symptoms of **hypercalcemia**^Q
 - **Abdominal distention, jaundice**

Evaluation

Triple Assessment

- **Clinical examination**^Q
- **Imaging (USG or mammography)**^Q
- **Tissue sampling (FNAC or true cut biopsy)**^Q
- **Confident diagnosis by triple assessment in 99.9%**

- First investigation: **FNAC**^Q
- Best and diagnostic investigation: **Biopsy**^Q

- MC cancer in women in India: **CA cervix**^Q
- MC cancer in urban women in India: **CA breast**^Q
- MC cancer in women in the world: **CA breast**^Q
- MC cause of cancer related death in men and women: **CA lung**^Q
- 2nd MC cause of cancer related death in women: **CA breast**^Q

8. Ans. c. Biopsy (Ref: Schwartz 10/e p529-530, 9/e p450; Sabiston 19/e p830-831; Bailey 26/e p800, 25/e p829; Devita 9/e p1407)

CA BREAST

- First investigation for tissue sampling: **FNAC**^Q
- Best and diagnostic investigation: **Biopsy**^Q

FNAC	True-cut (core-cut) Biopsy
• FNA is easily performed , but requires a trained cytopathologist ^Q for accurate specimen interpretation.	• Core cutting needle biopsy provides a histologic specimen suitable for interpretation by any pathologist ^Q .
• False-negative results ^Q are most common in fibrotic or well-differentiated tumors .	• ER, PR status and presence of HER-2 overexpression can be routinely determined ^Q from core biopsy specimens.
• FNA does not reliably distinguish invasive cancer from DCIS ^Q , potentially leading to the overtreatment of gross DCIS.	• Diagnostic technique of choice for patients who will receive preoperative systemic therapy ^Q .

Biopsy Techniques for Breast Lesions

Technique	Advantages	Disadvantages
FNAC	<ul style="list-style-type: none"> • Rapid, painless, inexpensive. • No incision prior to selection of local therapy 	<ul style="list-style-type: none"> • Does not distinguish invasive from in situ cancer^Q. • Markers (ER, PR, HER-2) not routinely available^Q. • Requires experienced cytopathologist^Q. • False negatives and insufficient specimens occur.

True-cut (core-cut) Biopsy	<ul style="list-style-type: none"> • Rapid, relatively painless, inexpensive. No incision. • Can be read by any pathologist^Q, markers (ER, PR, HER-2) routinely available^Q. 	<ul style="list-style-type: none"> • False-negative results, incomplete lesion characterization can occur.
Excisional biopsy	<ul style="list-style-type: none"> • False-negative results rare. • Complete histology before treatment decisions. • May serve as definitive lumpectomy. 	<ul style="list-style-type: none"> • Expensive, more painful. • Creates an incision to be incorporated into definitive surgery. • Unnecessary surgery with potential for cosmetic deformity in patients with benign abnormalities.

9. Ans. c. Mammography (Ref: Schwartz 10/e p523-529, 9/e p447-450; Sabiston 19/e p830-832; Bailey 26/e p799-801, 25/e p828-829)

- First investigation: Mammography
- First investigation for tissue sampling: FNAC
- Best and diagnostic investigation: Biopsy^Q

Investigations in CA Breast	
Mammography	<ul style="list-style-type: none"> • Initial investigation for symptomatic breast in women >35 years and for screening^Q • IOC for microcalcification^Q
Ultrasound	<ul style="list-style-type: none"> • Initial investigation for palpable lesions in women <35 years^Q • Not useful in screening
MRI	<ul style="list-style-type: none"> • Indicated in scarred breast, implants and borderline lesions for breast conservation • IOC for implant related complications^Q • Gold standard for imaging breast in females with implants^Q
PET scan	<ul style="list-style-type: none"> • IOC for detecting recurrences in scarred breast^Q • Useful in multifocal disease and in helping detect axillary involvement

ULTRASONOGRAPHY IN BREAST DISEASE

- **Initial investigation** for palpable lesions in **women <35 years**^Q
- **Young woman's breast** contains a **large proportion** of **glandular tissue** which appears as a **soft tissue density**^Q and **lowers the sensitivity of mammogram**^Q.
- The **sensitivity of ultrasound** for **detecting DCIS** is **significantly lower than mammography**^Q that is why **USG** is not a useful screening test for breast cancer.
- Ultrasonography is an important method of:
 - **Resolving equivocal mammographic findings**
 - Defining cystic masses
 - Demonstrating the echogenic qualities of specific solid abnormalities

Breast cysts	Smooth margins and echo-free center
Benign breast masses	Smooth contours , round or oval shapes, weak internal echoes Well-defined anterior and posterior margins ^Q .
Breast cancer	Irregular walls ^Q but may have smooth margins with acoustic enhancement

10. Ans. b. Needle biopsy

11. Ans. a. MRI

12. Ans. a. MRI

13. Ans. d. (MRI): Schwartz 9th/447-450; Harrison 19th/e p526; Sabiston 19th/830-832; Bailey 26th/799-801, 25th/828-829

A 60-year-old lady comes with blood stained discharge from the nipple with family history of breast cancer. Next best step for her (high risk female) will be MRI for screening of breast cancer.

"There is current interest in the use of MRI to screen the breasts of high-risk women and of women with a newly diagnosed breast cancer. In the first case, women who have a strong family history of breast cancer or who carry known genetic mutations require screening at an early age, but mammographic evaluation is limited because of the increased breast density in younger women. In the second case, an MRI study of the contralateral breast in women with a known breast cancer has shown a contralateral breast cancer in 5.7% of these women." - Schwartz 9th/450

"However, the ACS suggests that younger women who are BRCA1 or BRCA2 carriers or untested first-degree relatives of women with cancer; women with a history of radiation therapy to the chest between ages 10 and 30 years; women with a lifetime risk of breast cancer of at least 20%; and women with a history of Li-Fraumeni, Cowden, or Bannayan-Riley-Ruvalcaba syndromes may benefit from MRI screening, where the higher sensitivity may outweigh the loss of specificity." - Harrison 19th/e p526

MAMMOGRAPHY

14. Ans. a. Mammography (Ref: Grainger 5/e p1190, 1188)

- Mammography remains more sensitive for detecting Ductal carcinoma in situ (DCIS)^Q
- Screening with MRI is superior to mammography in detecting invasive breast cancer in younger women^Q, where the sensitivity of mammography is low due to presence of mammographically dense breast parenchyma^Q
- Although mammography remains more sensitive for detecting Ductal carcinoma in-situ (DCIS)^Q
- Mammography is the screening modality of choice for breast cancer because it can detect microcalcification which is often the only manifestation of DCIS^Q.
- The sensitivity of ultrasound for detecting DCIS is significantly lower than mammography^Q that is why USG is not a useful screening test for breast cancer.
- MRI can not detect calcification^Q

Indications for Breast MRI

1. Lobular carcinoma^Q: Difficult to detect and measure by conventional method because of multifocal and infiltrating growth pattern
2. Staging of primary breast cancer^Q
3. Occult primary tumour with malignant axillary lymphadenopathy and normal mammogram and breast USG^Q
4. Screen younger women with high familial risk of breast cancer^Q
5. Assessing the integrity of breast implant^Q

15. Ans. a. Indicated in 50–70 years of age, b. Mortality reduced by 30%

(Ref: Schwartz 10/e p523–525, 9/e p447; Sabiston 19/e p831–832; Bailey 26/e p799, 25/e p828)

MAMMOGRAPHY

- Delivers a radiation dose of 0.1 cGy^Q per study (chest radiography delivers 25% of this dose)^Q
- No increased breast cancer risk^Q associated with the radiation dose delivered with screening mammography.
- Used to detect unexpected breast cancer in asymptomatic women.
- Two views of the breast are obtained, the craniocaudal view and mediolateral oblique view
 - The MLO view images the greatest volume^Q of breast tissue, including the upper outer quadrant and axillary tail of Spence
 - The CC view provides better visualization of the medial aspect of the breast and permits greater breast compression^Q
- Mammography also is used to guide interventional procedures, including needle localization and needle biopsy.
- Sensitivity is much reduced in younger or dense breasts, considered inappropriate in patients <35 years^Q.

Mammographic features suggestive of breast cancer

- A solid mass with or without stellate features^Q
- Asymmetric thickening^Q of breast tissues
- Clustered microcalcifications^Q
 - The presence of fine, stippled calcium in and around a suspicious lesion is suggestive of breast cancer and occurs in as many as 50% of nonpalpable cancers^Q
 - These microcalcifications are an especially important sign of cancer in younger women, in whom it may be the only mammographic abnormality^Q

Advantages

- Around 33% reduction in mortality^Q for women after screening mammography.
- Mammography was more accurate than clinical examination for the detection of early breast cancers, providing a true-positive rate of 90%.
- Starting at age 40 years, breast examinations should be performed yearly and a yearly mammogram should be taken^Q.
- Mammography helps in 40% reduction in stage II, III, and IV cancer in the screened population, with a 30% increase in overall survival^Q.

16. Ans. c. Macrocalcification (Ref: Schwartz 10/e p523-525, 9/e p447; Sabiston 19/e p831-832; Bailey 26/e p799, 25/e p828)

Mammography		
	Benign	Malignant
Opacity	<ul style="list-style-type: none"> • Smooth margin • Low density • Homogeneous • Thin halo 	<ul style="list-style-type: none"> • Ill defined^Q margin, irregular stellate, spiculated^Q margin, comet tail^Q • High density^Q • Heterogeneous • Wide halo^Q
Calcification	• Macrocalcification ^Q (>0.5 mm in diameter)	• Microcalcification ^Q (<0.5 mm in diameter)
Breast Parenchyma	• Normal	• Architectural distortion ^Q
Nipple/areola	• Normal	• ± Retracted
Skin	• Normal	• Thickened ^Q
Cooper ligaments	• Normal	• Thickened ^Q , increased number
Subcutaneous retro mammary space	• Normal	• Obliterated ^Q

17. Ans. a. Breast Imaging Reporting and Data System (Ref: Sabiston 19/e p834)

BIRADS (Breast Imaging Reporting And Data System)	
Category	Definition
0	Incomplete assessment, need additional imaging evaluation ^Q
1	Negative, routine mammogram in 1 year is recommended ^Q
2	Benign findings, routine mammogram in 1 year is recommended ^Q
3	Probably benign findings, short term follow-up suggested ^Q
4	Suspicious abnormality, biopsy should be considered ^Q
5	Highly suggestive of malignancy, appropriate action should be taken ^Q
6	Known biopsy-proven malignancy

18. Ans. a. Nodular calcification

19. Ans. a. Fibroadenoma (Ref: Robbins 7/e p1149)

Pattern of Calcification in Breast Diseases	
Carcinoma	Microcalcification, punctate, branching ^Q
Fibroadenoma	Popcorn ^Q (coarse, granular, crushed stone)
Fibrocystic disease	Powdery
Fat necrosis	Curvilinear

20. Ans. d. Carcinoma

21. Ans. c. It should be part of the regular follow up of a woman following therapy for unilateral breast cancer

22. Ans. c. 40 years

23. Ans. d. Highly suggestive of malignancy

CARCINOMA BREAST RISK FACTORS

24. Ans. a. Nulliparity, c. Family history, d. BRCA-1 mutation, e. Estrogen

(Ref: Schwartz 10/e p511-512, 9/e p436-438; Sabiston 19/e p834; Bailey 26/e p808-809, 25/e p837)

Risk Factors for Breast Cancer	
<ol style="list-style-type: none"> 1. Age: Incidence increases with age^Q 2. Country of birth: More common in western countries^Q 3. Family history and genetic risk factors (BRCA)^Q 4. Hyperestrogenemia: <ul style="list-style-type: none"> – Early menarche^Q, late menopause^Q – Nulliparity^Q – Obesity^Q 5. Late first full term pregnancy^Q 	<ol style="list-style-type: none"> 6. Alcohol and high fat diet^Q 7. Personal history of malignancy: <ul style="list-style-type: none"> – Contralateral breast cancer^Q – Ovarian and endometrial cancer^Q 8. Previous benign breast disease^Q 9. High socioeconomic status^Q 10. Radiation exposure^Q 11. Hormone replacement therapy^Q

- Combined (estrogen + progesterone) HRT is associated with increased risk of CA breast.^Q
- Only estrogen HRT is not associated with increased risk of CA breast.^Q

- Smoking^Q and OCPs^Q doesn't appear to increase risk of breast cancer
- Longer duration of breast feeding has a protective effect^Q

25. Ans. b. Epithelial hyperplasia (Ref: Schwartz 10/e p508, 9/e p433-434; Sabiston 19/e p835; Bailey 26/e p809, 25/e p837)

Proliferative Lesions Relative Risks for Developing Invasive Breast Cancer	
Nonproliferative changes: 70% Relative Risk = 1.0	<ul style="list-style-type: none"> • Adenosis • Cysts and apocrine change • Ductal ectasia • Mild epithelial hyperplasia of usual type
Proliferative disease without atypia: 26% Relative Risk = 1.5–2.0	<ul style="list-style-type: none"> • Hyperplasia of usual type, moderate or florid • Papilloma • Sclerosing adenosis
Proliferative disease with atypia: 4% Relative Risk = 4–5	<ul style="list-style-type: none"> • Atypical ductal hyperplasia^Q • Atypical lobular hyperplasia^Q

26. Ans. a. Hyperplasia atypical (Ref: Schwartz 10/e p508, 9/e p434; Sabiston 19/e p835; Bailey 26/e p809, 25/e p837)

Cancer Risk Associated (with Benign Breast Disorders and In Situ Carcinoma of the Breast)	
Abnormality	Relative Risk
Nonproliferative lesions of the breast	No increased risk
Sclerosing adenosis	No increased risk
Intraductal papilloma	No increased risk
Florid hyperplasia	1.5 to 2-fold
Atypical lobular hyperplasia ^Q	4-fold
Atypical ductal hyperplasia ^Q	4-fold
Ductal involvement ^Q by cells of atypical ductal hyperplasia	7-fold
Lobular carcinoma in situ ^Q	10-fold
Ductal carcinoma in situ ^Q	10-fold

27. Ans. d. Atypical ductal hyperplasia

28. Ans. c. Commoner in nulliparous women

29. Ans. b. First child at a younger age

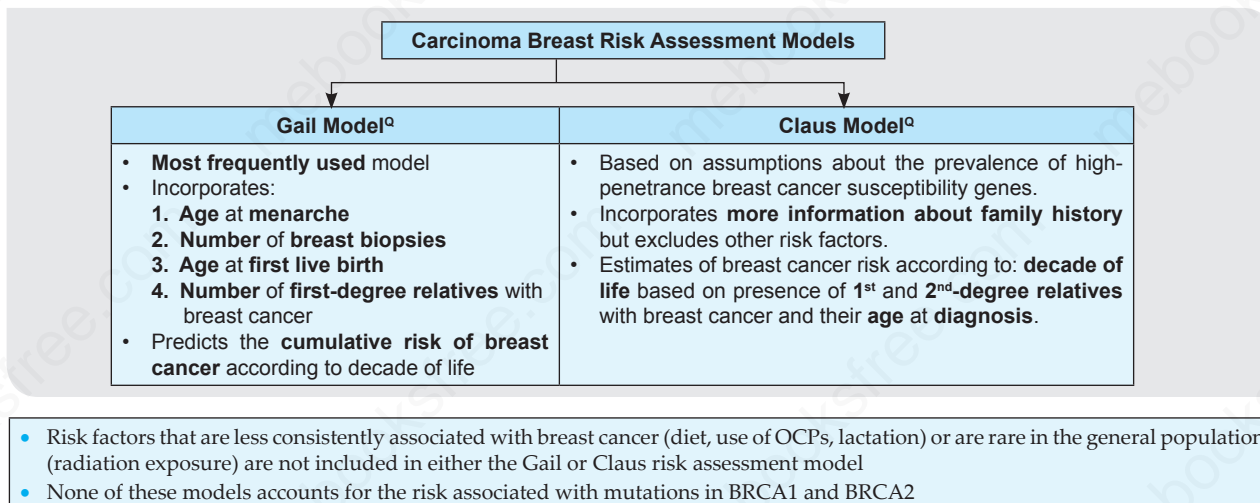
30. Ans. d. 60

(Ref: Schwartz 10/e p514-515, 9/e p437-440; Sabiston 19/e p835-837; Bailey 26/e p817-818, 25/e p846; Harrison 18/e p754-755; Devita 9/e p1373)

- Harrison says "Women who inherit a mutated allele of **BRCA-1** gene from either parent have at least a **60–80% lifetime chance of developing breast cancer** and about a **33% chance of developing ovarian cancer**."
- Schwartz says "Germline mutations in **BRCA1** represent a predisposing genetic factor in as many as 45% of hereditary breast cancers and in at least 80% of hereditary ovarian cancers. Female mutation carriers have up to a 90% lifetime risk for developing breast cancer and up to a 40% lifetime risk for developing ovarian cancer."

BRCA-1	BRCA-2
• Chromosome: 17 ^Q	• Chromosome: 13 ^Q
• BRCA-1 associated breast cancers:	• BRCA-2 associated cancers:
– Invasive ductal carcinomas	– Invasive ductal carcinomas
– Poorly differentiated ^Q	– Well differentiated ^Q
– Hormone-receptor negative ^Q	– Hormone-receptor positive ^Q .
– Early age of onset	– Early age of onset
– Bilateral	– Bilateral
• Associated ovarian, colon and prostate cancers ^Q .	• Associated ovarian, colon, prostate, pancreas, gall bladder, stomach cancers and melanoma ^Q . (95 m)

31. Ans. c. CA breast



32. Ans. c. Lung

33. Ans. a. Increased risk in relatives, c. Nullipara, d. High fat diet, e. Who avoided breast feeding

34. Ans. d. Ataxia telangiectasia (Ref: Schwartz 10/e p514-515, 9/e p438; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846)

Incidence of Sporadic, Familial and Hereditary Breast Cancer	
Sporadic breast cancer^a	65-75%
Familial breast cancer^a	20-30%
Hereditary breast cancer	5-10%
• BRCA1 ^a	45%
• BRCA2 ^a	35%
• p53 (Li-Fraumeni syndrome) ^a	1%
• STK11/LKB1a (Peutz-Jeghers syndrome) ^a	<1%
• PTENa (Cowden disease) ^a	<1%
• MSH2/MLH1a (Muir-Torre syndrome) ^a	<1%
• ATMa (Ataxia-telangiectasia) ^a	<1%
• Unknown	20%

Hereditary Breast Cancer
• BRCA and PLACH: PJS, Li-Fraumeni, Ataxia telangiectasia, Cowden's, HNPCC

35. Ans. a. Ductal carcinoma (Ref: Schwartz 10/e p514-515, 9/e p438-440; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846)

36. Ans. b. Epitheliosis

37. Ans. c. Fibrocystic change (Ref: Robbins 7/e p1127)

- Fibrocystic change doesn't lead to carcinoma breast.
- Robbins says "Fibrocystic changes (Non-proliferative breast changes): Non-proliferative changes are most likely part of the spectrum of histologic features that can be observed in normal breast."

38. Ans. b. Atypical hyperplasia, d. Florid hyperplasia

39. Ans. a. First degree relative, b. Atypical hyperplasia, d. Increased fat intake

40. Ans. a. Consume fatty food, e. Did not breastfed their children

41. Ans. a. Those who avoid breast-feeding to the infant, c. Nulliparity, d. High fat diet, e. Family history of breast cancer

42. Ans. c. 17

43. Ans. a. Have an early menarche and late menopause, c. Have their first child after the age of 35 years, d. Avoid breast feeding, e. Are nuns

44. Ans. b. Sister died from cancer, c. Jewish origin

45. Ans. d. Epitheliosis

46. Ans. c. Atypical lobular hyperplasia, d. Atypical ductal hyperplasia

47. Ans. c. Those who have not breast fed their children

48. Ans. b. Multiparity & prolonged lactation
 49. Ans. d. Early full term pregnancy
 50. Ans. a. No risk

CARCINOMA BREAST

51. Ans. a. Ductal carcinoma in-situ (Ref: Schwartz 10/e p520, 9/e p444; Sabiston 19/e p840-842; Bailey 26/e p810, 25/e p838)

DCIS (Ductal carcinoma in situ)	
<ul style="list-style-type: none"> Among the mammographically detected cancer, almost half are DCIS. DCIS most frequently presents as mammographic calcifications. 	
Histological types of DCIS (five types) 1. Comedocarcinoma ^Q 2. Cribiform ^Q 3. Micropapillary ^Q 4. Solid 5. Papillary ^Q	Low Grade: Cribiform, Papillary and Micropapillary High Grade: Solid and Comedocarcinoma

52. Ans. c. Poor Prognosis
 53. Ans. a. Single file pattern
 54. Ans. a. Axillary LN, b. Internal mammary LN (Ref: Bailey 26/e p810, 25/e p839; BDC 4/e pool-I /42-43)

LYMPHATIC METASTASIS IN CA BREAST

- Lymphatic spread in CA breast occurs through subareolar lymphatic plexus of Sappey's lymphatic plexus, cutaneous lymphatics and inflammatory lymphatics^Q.
 - Lymphatic metastasis occurs primarily to the axillary (75%)^Q and the internal mammary lymph nodes^Q.
 - Tumors in the posterior one third of the breast are more likely to drain to the internal mammary nodes^Q.
- The involvement of lymph nodes has both biological and chronological significance.
- It represents not only an evolutionary event in the spread of the carcinoma but is also a marker for the metastatic potential^Q of that tumour.
- Involvement of supraclavicular nodes and of any contralateral lymph nodes represents advanced disease^Q.
- LN metastasis is treated by surgical dissection or radiotherapy

55. Ans. a. Her-2-neu, b. p53, c. BRCA-1, e. CEA (Ref: Schwartz 9/e p438; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846; Harrison 17/e p604, 483)
 • BCL-1 gene is expressed in mantle cell lymphoma^Q.
 • Her-2-neu, p53, BRCA-1 and CEA is expressed in CA breast^Q.
 56. Ans. b. Breast mass
 57. Ans. a. Upper outer
 58. Ans. a. {I= (0.2 x size) + grade + nodes} (Ref: Bailey 25/e p841)

NOTTINGHAM PROGNOSTIC INDEX (NPI)

- NPI= (0.2 X tumor size in cm) + Tumor grade (1-3) + LN stage (1-3)^Q
- Used to select patients for adjuvant treatment

59. Ans. c. Inflammatory carcinoma (Ref: Schwartz 10/e p520-522, 9/e p468; Sabiston 19/e p864-865; Devita 7/e p1420)

INFLAMMATORY CARCINOMA

- Ominous clinical category^Q associated with diffuse tumor involvement of the lymphatic channels^Q within the breast and overlying skin

WHO Classification of Breast Cancer		
In-situ Carcinoma	Invasive Carcinoma (MC)	Paget's Disease of Nipple
<ul style="list-style-type: none"> Ductal carcinoma in-situ Lobular carcinoma in-situ 	<ul style="list-style-type: none"> Ductal carcinoma (MC) Lobular carcinoma Tubular (Cribiform) carcinoma Mucinous (Colloid) carcinoma Medullary carcinoma Papillary carcinoma Metaplastic carcinoma Inflammatory carcinoma 	

Invasive Breast Carcinoma

- Invasive ductal carcinoma
- **Invasive ductal carcinoma** of the breast with **productive fibrosis (scirrhous^Q, simplex, NST)** accounts for **80%** of breast cancers
- Presents with macroscopic or microscopic **axillary LN metastases** in up to **60%**^Q of cases.
- Usually occurs in **perimenopausal** or **postmenopausal** women in the **5th to 6th** decades of life
- Presents as a **solitary, firm mass^Q**.

Medullary Carcinoma

- **Special-type** breast cancer, accounts for 4% of all invasive breast cancers
- Frequent phenotype of **BRCA-1** hereditary breast cancer.
- Grossly, the cancer is **soft** and **hemorrhagic**.
- A **rapid increase in size** may occur secondary to necrosis and hemorrhage.
- On physical examination, it is **bulky** and often **positioned deep** within the breast.

Medullary Carcinoma is Characterized Microscopically by

- **Dense lymphoreticular infiltrate** of **lymphocytes** and **plasma cell**
 - **Large pleomorphic nuclei**
 - **Sheet-like growth pattern**
- Better 5-year survival rate than those with NST or invasive lobular carcinoma.

Mucinous Carcinoma (Colloid Carcinoma)

- **Special-type** breast cancer, accounts for 2% of all invasive breast cancers
- Typically presents in the **elderly population** as a **bulky tumor**.
- Characterized by **extracellular pools of mucin**
- **Analysis of multiple sections** is essential to **confirm the diagnosis**
- **LN metastases** occur in 33% of cases, and 5- and 10-year survival rates are 73 and 59%, respectively.

Papillary Carcinoma

- **Special-type** cancer of the breast that accounts for 2% of all invasive breast cancers.
- Presents in the **7th decade** of life and occurs in a disproportionate number of **nonwhite women**.
- Typically **small** and rarely attain a size of 3 cm in diameter.
- Defined by **papillae with fibrovascular stalks** and **multilayered epithelium**.
- **Low frequency** of axillary LN metastases and had 5- and 10-year survival rates similar to those for mucinous and tubular carcinoma.

Tubular Carcinoma

- **Special-type** breast cancer and accounts for 2% of all invasive breast cancers.
- Usually diagnosed in the **perimenopausal** or **early menopausal periods**.

- **Distant metastases are rare in tubular carcinoma** with **long-term survival approaches 100%**^Q

Invasive Lobular Carcinoma

- Accounts for 10% of breast cancers.

- **Invasive lobular carcinoma is frequently multifocal, multicentric, and bilateral.**^Q

60. Ans. a. Comedocarcinoma, c. Lobular carcinoma in situ

61. Ans. a. Comedocarcinoma

62. Ans. a. Ductal carcinoma in situ

63. Ans. d. Tubular

64. Ans. b. Lobular carcinoma

65. Ans. b. Infiltrating lobular

66. Ans. c. Lobular carcinoma

67. Ans. c. Lobular carcinoma

68. Ans. d. Comedo DCIS

69. Ans. d. More common in Muslims

70. Ans. b. Colloid (Mucinous)

71. Ans. a. Breast (Ref: Robbins 7/e p285; Sabiston 19/e p705)

72. Ans. d. Familial breast/ovarian cancer

FAMILIAL CANCERS

- Familial cancers occur at **higher frequency** in **certain families** without a clearly defined pattern of transmission^Q.
- Examples include carcinomas of:
 - Breast^Q, colon^Q, ovary^Q
 - Brain^Q, melanoma^Q

Familial Cancer Syndromes			
Syndrome	Genes	Locations	Cancer Sites and Associated Traits
Breast/ovarian syndrome	BRCA1	17q21 ^Q	Cancer of breast, ovary, colon, prostate ^Q
	BRCA2	13q12.3 ^Q	Cancer of breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma ^Q
Cowden's disease	PTEN	10q23.3 ^Q	Cancer of breast, endometrium, thyroid ^Q
FAP	APC	5q21 ^Q	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	hMLH1 ^Q	3p21 ^Q	Colorectal cancer, endometrial cancer, transitional cell carcinoma of ureter and renal pelvis, carcinomas of the stomach, small bowel, pancreas, ovary ^Q
	hMSH2 ^Q	2p22-21	
	hMSH6	2p16 ^Q	
	hPMS1	2q31.1	
	hPMS2	7p22.2 ^Q	

Hereditary papillary RCC	MET ^Q	7q31 ^Q	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	
Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	p53	17p13 ^Q	Breast cancer, soft tissue sarcoma, osteosarcoma, brain tumors, adrenocortical carcinoma, Wilms' tumor, phyllodes tumor (breast), pancreatic cancer, leukemia, neuroblastoma ^Q
	hCHK2	22q12.1	
MEN-1	MENIN ^Q	11q13 ^Q	Pancreatic islet cell tumors, parathyroid hyperplasia, pituitary adenomas ^Q
MEN-2	RET ^Q	10q11.2	Medullary thyroid cancer, pheochromocytoma, parathyroid hyperplasia ^Q
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	NF1 ^Q	17q11 ^Q	Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain tumors ^Q
Neurofibromatosis -2	NF2 ^Q	22q12 ^Q	Acoustic neuromas, meningiomas, gliomas, ependymomas ^Q
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	STK11 ^Q	19p13.3 ^Q	Gastrointestinal carcinomas, breast cancer, testicular cancer, pancreatic cancer, benign pigmentation of skin and mucosa ^Q
Retinoblastoma	RB ^Q	13q14 ^Q	Retinoblastoma, sarcomas, melanoma, malignant neoplasms of the brain and meninges ^Q
Tuberous sclerosis	TSC1	9q34	Multiple hamartomas, RCC, astrocytoma
	TSC2	16p13	
von Hippel-Lindau syndrome	VHL ^Q	3p25 ^Q	RCC, hemangioblastomas of retina and CNS, pheochromocytoma ^Q
Wilms' tumor	WT ^Q	11p13 ^Q	Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation ^Q

	LCIS	DCIS
Age (years)	44–47 (Early)	54–58 (Late) ^a
Incidence	2–5% (Less common)	5–10% (More common) ^a
Clinical signs	None	Mass, pain, nipple discharge
Mammographic signs	None	Microcalcifications ^a
Premenopausal	2/3 ^a	1/3
Incidence of synchronous invasive carcinoma	5%	2–46% ^a
Multicentricity	60–90% ^a	40–80%
Bilaterality	50–70% ^a	10–20%
Axillary metastasis	1%	1–2% ^a
Subsequent carcinomas:		
Incidence	25–35%	25–70% ^a
Laterality	Bilateral ^a	Ipsilateral
Interval to diagnosis	15–20 years ^a	5–10 years
Histologic type	Ductal	Ductal

73. Ans. b. Pretracheal

74. Ans. c. More common in muslims

75. Ans. c. Lymphatic permeation (Ref: Bailey 26/e p811, 25/e p840)

PEAU-D-ORANGE

- Peau-d-orange is due to **cutaneous lymphatic edema**, where the infiltrated skin is tethered by sweat ducts, it can not swell, leading to an appearance like **orange skin**^a.
- Due to **obstruction of subdermal lymphatics (lymphatic permeation by tumor cells)**
- Seen in **advanced breast cancer** (may be seen in **chronic abscess**)

76. Ans. a. Carcinoma breast, c. Chronic abscess

77. Ans. d. Lumbar vertebra (Ref: Bailey 26/e p811)

- Most common site of metastasis from breast carcinoma is lumbar vertebra.

Bailey says that "It is by this route (**spread by the bloodstream**) that **skeletal metastases** occur, although the initial spread may be via the lymphatic system. **In order of frequency the lumbar vertebrae, femur, thoracic vertebrae, rib and skull are affected** and these deposits are generally **osteolytic**."

78. Ans. a. Lobular carcinoma

79. Ans. d. Increased incidence with prolonged breast feeding

80. Ans. b. Recent retraction of nipple, e. Cellular atypia

81. Ans. b. Blockage of subdermal lymphatics

82. Ans. b. Obstruction of lymphatic ducts

83. Ans. a. Axillary nodes are most commonly involved, b. Internal mammary nodes are also involved, c. If supraclavicular lymph node is involved then it is N3, d. Axillary nodes are treated by surgical resection (Ref: Bailey 25/e p839; BDC 4/e pool-I/42–43) See question no. 49.

84. Ans. d. Bone

85. Ans. d. Invasive ductal carcinoma

86. Ans. d. Lower inner quadrant (Ref: Bailey 25/e p840)

- Upper inner (12–15%) • Upper outer (~ 50%) • Lower inner (3–5%) • Lower outer (6–10%) • Central/areolar (20%)

87. Ans. b. Subareolar duct (Ref: Bailey 25/e p834)

- Retraction of nipple is due to fibrosis in and around subareolar duct
- Retraction/dimpling of skin is due to involvement of cooper's ligament
- Peau-D-orange is due to blockage of subdermal lymphatics

88. Ans. b. DCIS (Ref: Bailey 25/e p838)

VAN NUYS PROGNOSTIC INDEX (VNPI)

- Van Nuys prognostic index (VNPI) is widely used to classify ductal carcinoma in situ (DCIS) into dissimilar risk categories that may be treated accordingly. Attempts have been made to identify subsets of DCIS for which wide excision without irradiation would provide sufficient local control.
- Silverstein and colleagues derived the **Van Nuys criteria** from a series of DCIS patients treated by wide excision with and without radiation therapy and proposed a system to identify patients who do not need radiation therapy based on:
 1. Patient's age
 2. DCIS nuclear grade and presence of microcalcification
 3. Size of the lesion
 4. Width of the surgical margin.

89. Ans. c. Raloxifene is a SERM that prevents breast cancer but increases risk of endometrial cancer

CARCINOMA BREAST STAGING

90. Ans. d. T3 N3 M0 (Ref: Schwartz 10/e p532, 9/e p452; Sabiston 19/e p847; Bailey 25/e p841)

7th AJCC (2010) TNM Staging for Breast Cancer	
T: Primary tumor	
T1: Tumor ≤ 2 cm	T4b: Edema (including peau d'orange) or ulceration of skin, or satellite skin nodules confined to the same breast
T2: Tumor >2 cm and ≤ 5 cm	T4c: Both T4a and T4b
T3: Tumor >5 cm	T4d: Inflammatory carcinoma
T4a: Extension to chest wall , not including pectoralis muscle	
N: Regional lymph nodes	
N1: Metastasis to movable ipsilateral axillary LNs	N3a: Metastasis in ipsilateral infraclavicular LNs
N2a: Metastasis in ipsilateral axillary LNs fixed or matted	N3b: Metastasis in ipsilateral internal mammary LNs and axillary LNs
N2b: Metastasis in clinically apparent ipsilateral internal mammary LNs and in the absence of clinically evident axillary LNs metastasis	N3c: Metastasis in ipsilateral supraclavicular LNs
M: Distant metastases	
M0: No distant metastasis; M1: Distant metastasis	

[Note: Clinically apparent is defined as detected by **imaging studies** (excluding lymphoscintigraphy) or by **clinical examination** or **grossly visible pathologically**.]

Stage I	Stage IIA	Stage IIB	Stage IIIA	Stage IIIB	Stage IIIC	Stage IV
T1 N0 M0	T0 N1 M0 T1 N1 M0 T2 N0 M0	T2 N1 M0 T3 N0 M0	T0 N2 M0 T1-2 N2 M0 T3 N1-2 M0	T4 N0-2 M0	AnyT N3 M0	AnyT anyN M1

Special Conditions in Staging	
Positive LN in opposite axilla	Metastasis
Two mass in same breast	Staging according to big mass
Mass in both breasts	Separate staging for both breasts

91. Ans. b. Pectoralis major (Ref: Schwartz 9/e p452; Sabiston 19/e p847; Bailey 25/e p841)

- Chest wall involvement** means involvement of **ribs^o**, **intercostal muscles^o** or **Serratus anterior^o** as **chest wall** is formed by these structures **not the pectoralis major**.

92. Ans. c. IIIC
 93. Ans. a. Nipple retraction
 94. Ans. a. T₁N1M0
 95. Ans. d. T3N3M0
 96. Ans. c. T2N3M0
 97. Ans. c. T1cN1bM0
 98. Ans. d. T4 is any size
 99. Ans. d. M1

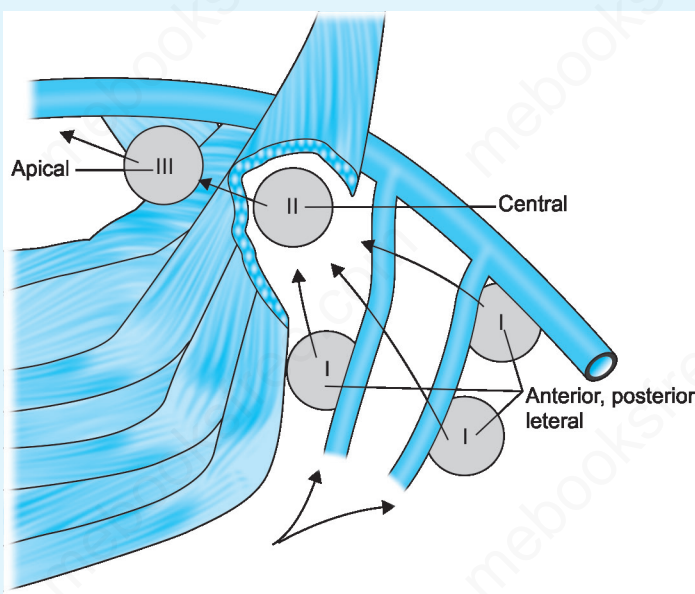
CARCINOMA BREAST MANAGEMENT

100. Ans. c. Pectoralis minor is divided (Ref: Schwartz 10/e p547-549, 9/e p460-461; Sabiston 19/e p849-853; Bailey 26/e p813-814, 25/e p842)

Types of Mastectomy	
Simple or Total mastectomy	Removal of breast tissue, nipple-areola complex, and skin ^a .
Extended simple mastectomy	Simple mastectomy + removal of level I axillary LNs.
Modified radical mastectomy	Removes all breast tissue, nipple-areola complex, skin and level I and II axillary LNs ^a .
Halstead's radical mastectomy	Removes all breast tissue and skin, nipple areola complex, pectoralis major and minor muscles and the level I, II and III axillary LNs ^a .
Extended radical mastectomy	Radical mastectomy + Removal of internal mammary LNs
Super radical mastectomy	Radical mastectomy + Removal of internal mammary, mediastinal and supraclavicular LNs

Variants of MRM	
Auschincloss Procedure	Removes all breast tissue, nipple-areola complex, skin and level I and II axillary LNs ^a .
Patey's Procedure	Pectoralis minor is removed to allow complete dissection of level III axillary LNs ^a
Scanlon's modification of Patey's procedure	Pectoralis minor is divided instead of removing ^a . Division of pectoralis minor allows complete removal of level III axillary LNs ^a

Axillary LN Levels in relation with Pectoralis minor		
Level	Relation with Pectoralis minor	Axillary LNs Included
I	Below or lateral	Anterior, posterior, lateral ^a
II	Posterior (behind)	Central, Interpectoral ^a
III	Medial or above	Apical ^a



101. Ans. a. Lumpectomy, b. Radiotherapy, d. Axillary LN dissection, e. Sentinel LN biopsy (Ref: Schwartz 10/e p547, 9/e p460-461; Sabiston 19/e p850-851; Bailey 26/e p813-814, 25/e p843)

BREAST CONSERVATIVE SURGERY (BCT)

- Involves **resection of primary breast cancer** with a margin of normal appearing breast tissue, **adjuvant radiation therapy** with or without assessment of axillary LN status^Q.
- Surgical procedures employed: **wide local excision, lumpectomy, quadrantectomy**
- BCT is currently treatment for women with DCIS, Stage I and Stage II invasive breast cancer^Q.

Suitable candidates for BCT

- The cancer is **solitary**, with no clinical or mammographic evidence of cancer elsewhere in the breast.
- The tumour can be **excised with tumor free surgical margins** without producing a cosmetically unacceptable breast.
- There are **no contraindications to radiation**
- The patients is **willing and motivated** for breast conservation

Contraindications for BCT

Absolute contraindications	Relative contraindications
<ol style="list-style-type: none"> 1. Pregnancy^Q is an absolute contraindication to the use of breast irradiation. 2. Women with two or more primary tumors in separate quadrants of the breast or with diffuse malignant appearing micro calcifications^Q. 3. A history of prior therapeutic irradiation^Q to the breast region that would require treatment to an excessively high total-radiation dose to a significant volume 4. Persistent positive margins^Q after reasonable surgical attempts 	<ol style="list-style-type: none"> 1. History of collagen vascular disorders^Q (Scleroderma and active lupus erythematosus but not the rheumatoid arthritis) 2. Presence of multiple gross tumours in the same quadrant and indeterminate calcifications^Q 3. Large tumour in small breast^Q 4. Breast size, large pendulous breast^Q presents difficulty in delivering uniform radiation dose 5. Centrally located tumour^Q, for which removal of nipple-areola complex is required to obtain a tumour free margin

102. Ans. a. Distant metastasis (Ref: *Breast diseases by Jay R. Harris 2/e p354; Bailey 25/e p839, 840*)

Radical Mastectomy	
Indications	Contraindications
<ul style="list-style-type: none"> Large, bulky tumor involving the pectoralis major muscle or the fascia Bulky axillary LN involvement Grossly involved interpectoral nodes in whom posterior fascia of muscle is also involved 	<ul style="list-style-type: none"> Non-palpable or small tumor^Q Advanced disease with distant metastasis^Q Who wants reconstructive surgery Need of improved cosmetic result that is achieved by MRM^Q Co-existing severe systemic diseases like DM, CHF or CRF^Q

103. Ans. a. Tumor size <4cm c. Mobile.

104. Ans. d. Supraclavicular lymph node (Ref: *Schwartz 9/e p461; Bailey 26/e p813, 25/e p842*)

Halstead's Radical mastectomy	
Structures Removed	Structures Preserved (ABC)
<ul style="list-style-type: none"> Whole breast, skin and nipple-areola complex^Q. Subcutaneous fat, deep fascia vertically from lower border of the clavicle upto the upper quarter of the sheath of the rectus abdominis and horizontally from sternum to anterior border of latissimus dorsi. Pectoralis major and minor muscle^Q with clavipectoral fascia^Q Level I, II and III axillary LNs^Q 	<ul style="list-style-type: none"> Axillary vein and cephalic vein^Q Long thoracic nerve of Bell (Nerve to serratus anterior)^Q.

105. Ans. b. Pectoralis major

106. Ans. d. Breast

107. Ans. a. Tamoxifene (Ref: *Schwartz 10/e p552, KDT 6/e p304; Goodman and Gillman's 10/e p1440, 1441*)

TAMOXIFEN
<ul style="list-style-type: none"> Tamoxifen is a standard hormonal treatment of breast cancer in both premenopausal and postmenopausal women^Q Tamoxifen is effective in Estrogen Receptor (ER) positive breast carcinoma but some ER negative tumors also respond to tamoxifen^Q.
<ul style="list-style-type: none"> Tamoxifen is approved for primary prophylaxis of breast cancer in high risk women^Q It reduces the recurrence rate of breast cancer in ipsilateral as well contralateral breast^Q Tamoxifen is associated with reduced risk of cancer in the contralateral breast^Q.
<ul style="list-style-type: none"> Dose: 10 mg BD X 5-years^Q While tamoxifen blocks estrogen receptors on the breast, it stimulates these receptors in the uterus (because tamoxifen is a partial agonist of ER), may lead to endometrial hyperplasia and endometrial cancer^Q
Tamoxifen
<ul style="list-style-type: none"> Potent antagonist in breast carcinoma cells, blood vessels and at some peripheral sites^Q Partial agonist in the uterus, bone, liver and pituitary^Q
<ul style="list-style-type: none"> Tamoxifen causes retinal deposits, decreased visual acuity and cataracts in occasional patients^Q Tamoxifen increases the risk of thromboembolic events^Q

108. Ans. d. Tamoxifen

- QUARTZ: Quadrantectomy + Axillary LN dissection + Radiotherapy^Q

109. Ans. b. Endometrium (Ref: *KDT 6th /304; Goodman and Gillman's 10/e p1440, 1441*)

Adverse Effects of Tamoxifen	
<ul style="list-style-type: none"> Hot flushes, nausea and vomiting (MC)^Q Menstrual irregularities^Q, vaginal bleeding, discharge, pruritus vulvae and dermatitis Endometrial cancer^Q 	<ul style="list-style-type: none"> Thromboembolism^Q Cataract^Q Retinal deposits and decreased visual acuity

110. Ans. c. Carcinoma in contralateral breast

111. Ans. d. Modified radical mastectomy followed by hormone therapy

(Ref: Schwartz 10/e p537-544, 9/e p454-457; Sabiston 19/e p858-864; Bailey 26/e p812-816, 25/e p841-842)

BREAST CANCER TREATMENT

A. Early Invasive Breast Cancer (Stage I, IIA, IIB):

- Mastectomy + Axillary LN status assessment^Q or
- BCT + Axillary LN status assessment + RT^Q
- If sentinel LN can not be identified or found to harbor metastatic disease, axillary LN dissection (**Level I+II**) should be done

Indications of adjuvant chemotherapy

1. LN positive^Q
2. Tumor >1 cm^Q
3. LN negative, >0.5 cm with adverse prognostic factors:
 - Blood vessel or lymph vessel invasion^Q
 - High nuclear or histologic grade^Q
 - Her-2-neu over expression^Q
 - Negative hormone receptor status^Q

- Tamoxifen should be given for hormone receptor positive, cancer >1 cm^Q
- Trastuzumab should be given for Her-2-neu positive cancer^Q

B. Locally Advanced Breast Cancer (Stage IIIA, IIIB, IIIC):

- Neoadjuvant chemotherapy + MRM + Adjuvant RT^Q
- BCT for IIIA with N1 with patients who achieve good response to neoadjuvant chemotherapy^Q
- Systemic chemotherapy + radiotherapy are indicated in treatment of grossly involved internal mammary nodes (N3b)

C. Distant Metastases (Stage IV):

- Prolong survival and improve quality of life^Q
- Hormonal therapies are preferred to cytotoxic therapy as it is associated with minimal toxicity^Q

Indications of Hormonal Therapy	Indications of Systemic Chemotherapy
1. Hormone receptor positive (ER/PR positive) ^Q	1. Hormone receptor negative ^Q
2. Bone or soft tissue metastases only ^Q	2. Hormone refractory ^Q (after 3 endocrine regimens)
3. Limited or asymptomatic visceral metastases	3. Symptomatic visceral metastases ^Q

Local Regional Recurrence

- Who had mastectomy: Resection of local regional recurrence with reconstruction + chemotherapy + hormonal therapy + RT (if not received RT previously)^Q
- Who had lumpectomy: Mastectomy with reconstruction + chemotherapy + hormonal therapy^Q

112. Ans. b. Postmastectomy radiation therapy is given when 4 or more lymph nodes are positive

(Ref: Schwartz 10/e p550, 9/e p463; Sabiston 19/e p858; Bailey 26/e p814, 25/e p843)

INDICATIONS OF RADIOTHERAPY IN CARCINOMA BREAST

- Locally Advanced Breast Cancer^Q (to decrease recurrence rate)
- Margin is positive after mastectomy^Q
- After breast conservation surgery^Q
- Metastases to 4 or more lymph nodes^Q

- Metastatic disease is the principal cause of death from breast cancer^Q.

113. Ans. a. Only breast

114. Ans. d. Axillary vein (Ref: Gray's 39/e p841)

AXILLARY NODE CLEARANCE

- Axillary node clearance can be defined as clearing the axillary contents bounded by:
 - Laterally: Axillary skin
 - Superiorly: Lower border of axillary vein^Q
 - Medially: Chest wall
 - Posteriorly: Lattissimus dorsi, Teres major and Subscapularis
 - Anteriorly: Pectoralis muscle

115. Ans. c. Latissimus dorsi (Ref: BDC 4/e vol-I/p62)

- Latissimus dorsi is active in **adduction, extension** and especially in **medial rotation** of the humerus.

116. Ans. c. Pectoralis major removed

117. Ans. b. Doxorubicin (Ref: Bailey 26/e p815, 25/e p844; Schwartz 10/e p550-551, 9/e p263)

CHEMOTHERAPY IN CA BREAST

- First-generation regimen such as a 6-monthly cycle of cyclophosphamide, methotrexate and 5-fluorouracil (CMF)^Q will achieve a 25% reduction in the risk of relapse over a 10- to 15-year period^Q.
- CMF is no longer considered adequate adjuvant chemotherapy^Q
- Modern regimens include an anthracycline (doxorubicin or epirubicin) and taxanes.

- The effect of combining hormone and chemotherapy is additive although hormone therapy is started after completion of chemotherapy to reduce side-effects.

- The most popular combinations were CMF and CAF^Q (Cyclophosphamide, Adriamycin [doxorubicin], and 5-fluorouracil).
- In the United States, a combination of Adriamycin (doxorubicin) and cyclophosphamide (AC) or AC plus a taxane (docetaxel, paclitaxel) are likely to be used as polychemotherapy^Q.
- For HER-2-positive breast cancer, adding trastuzumab^Q to polychemotherapy is approved for use as a surgical adjuvant.
- Anthracycline-containing combinations are significantly better than no treatment, single-agent treatment, or CMF^Q.

New Drugs in CA Breast	
Ixabepilone	• Used for anthracycline and taxane resistant breast cancer ^Q
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • Second line Her-2-neu therapy ^Q
Sunitinib	• Approved for advanced renal cancer and refractory metastatic breast cancer ^Q

118. Ans. c. Simple mastectomy

119. Ans. b. Modified radical mastectomy, d. Lumpectomy, axillary clearance and radiotherapy

120. Ans. a. Cyclophosphamide, methotrexate, 5-fluorouracil

121. Ans. b. Adriamycin based chemotherapy followed by tamoxifen depending on estrogen/progesterone receptor status

122. Ans. a. Prognosis is better, if given in young female, b, Increases survival by 20%, d. Hormone receptor positive gives good result
(Ref: Bailey 26/e p811, 25/e p844)

- CA breast in young females are found to have a **bad prognosis** and **more chances of recurrence** than carcinomas in older women, more likely to be **hormone receptor^Q negative**. Prognosis is improved in young women, if **adjuvant therapy** is given to them.
- Appropriate use of adjuvant chemotherapy or hormone therapy will **improve relapse-free survival** by approximately 30%^Q which ultimately translates into an absolute improvement in survival of the order of 10% at 15 years.
- Hormonal therapy is effective^Q in tumors positive for ER and PR.

123. Ans. a. Low socio-economic status, c. Multicentricity

124. Ans. c. Lobular carcinoma (Ref: Schwartz 9/e p460-461; Sabiston 19/e p850-851; Bailey 26/e p811, 25/e p843)

- Lobular carcinoma is frequently multifocal, multicentric and bilateral and is contraindication for breast conservative surgery^Q.

125. Ans. a. Large pendular breast, b. SLE, c. Diffuse microcalcification

126. Ans. b. History of previous radiation, e. 1st trimester pregnancy

127. Ans. a. 1 cm (Ref: Mastery of Surgery 5/e p525)

BREAST CONSERVATION SURGERY

- The amount of breast tissue excised with the lesion may vary with the clinical situation, but is typically 5 mm to 10 mm in all directions.
- BCS may consist of **removal of tumor with 1 cm margin of normal tissue** (wide local excision) or a more extensive excision of a whole quadrant of breast (Quadrantectomy).

128. Ans. c. Sentinel node biopsy

129. Ans. c. To prevent recurrence

130. Ans. c. Patey's with adjuvant chemotherapy
 131. Ans. a. Simple mastectomy followed by oophorectomy
 132. Ans. a. It was better if she took adjuvant therapy after mastectomy, b. First analyze estrogen and progesterone receptor levels on the tumor
 133. Ans. a. Letrozole, b. Anastrozole, c. Exemestane (Ref: Schwartz 10/e p552-553, 9/e p465-467; Sabiston 19/e p862-864; Bailey 25/e p844)

Hormonal Therapy in Carcinoma Breast
1. Ovarian suppression or ablation: <ul style="list-style-type: none"> – Bilateral oophorectomy^Q – Medically by LHRH agonist (Goserelin, Leuprolide)^Q
2. SERM: Tamoxifen and Raloxifene ^Q
3. Aromatase Inhibitors: <ul style="list-style-type: none"> – Non-steroidal: Letrozole and Anastrozole^Q – Steroidal: Exemestane^Q
4. Anti-estrogens: Fulvestrant ^Q
5. Progestins: Megesterol and Medroxyprogesterone acetate
Aromatase Inhibitors
<ul style="list-style-type: none"> • No increased risk of endometrial carcinoma^Q • Decreases bone mineral density and increases risk of fracture^Q • Used in post-menopausal patients^Q
Hormonal Therapy in Carcinoma Breast
<ul style="list-style-type: none"> • Tamoxifen is DOC in both pre-menopausal and post-menopausal patients^Q

134. Ans. a. 5 years
 135. Ans. d. Pectoralis minor

CARCINOMA BREAST PROGNOSTIC INDICATORS

136. Ans. a. Tumor size (Ref: Schwartz 10/e p535-536, 9/e p453-454; Bailey 26/e p811, 25/e p841; Harrison 17/e p566)

- The most important prognostic variables are provided by tumor staging^Q.
- The size of the tumor and status of the axillary LN provide reasonably accurate information on the likelihood of tumor relapse^Q.

Prognostic factors in carcinoma Breast

- The lymph node status is the most important prognostic indicator for tumor localized to breast^Q
- In case of metastasis, the prognosis no more depends upon the lymph node status^Q
 - In breast carcinoma metastasis, prognosis best depends upon estrogen and progesterone receptor status^Q (ER and PR status)
- Prognostic markers like PCNA, Ki-67, bcl-2, bax:bcl-2, VEGF, HER 2/neu, EGFr expressions are associated with poor prognosis^Q.

Prognostic and Predictive Factors for Invasive Breast Cancer	
Tumor Factors	Host Factors
• Nodal status	• Age
• Tumor size	• Menopausal status
• Histologic/nuclear grade	• Family history
• Lymphatic/vascular invasion	• Previous breast cancer
• Pathologic stage	• Immunosuppression
• Hormone receptor status	• Nutrition
• DNA content (ploidy, S-phase fraction)	• Prior chemotherapy
• Extent of intraductal component	• Prior radiation therapy
• HER-2/neu expression	

137. Ans. a. ER +ve, b. PR +ve
 138. Ans. b. Progesterone receptor +ve, e. ER +ve
 139. Ans. b. High HER-2-neu oncogene
 140. Ans. d. Axillary LN involvement
 141. Ans. b. Axillary lymph node status
 142. Ans. d. Inflammatory carcinoma
 143. Ans. b. Lymph node status

PROGNOSIS IN MALE BREAST CANCER

- Stage > Lymph node status is the best prognostic indicator^Q as in female breast carcinoma.

144. Ans. d. Decreased Her-2-neu oncogene
 145. Ans. a. HER-2-neu, b. p53, c. BRCA-1, e. CEA
 146. Ans. a. Tumour necrosis (Ref: Bailey 25/e p838)

Bloom-Richardson Grading (TNM)
1. Tubule formation ^Q
2. Nuclear pleomorphism ^Q
3. Mitotic count ^Q

Important Tumor Classification	
Chang staging ^Q	Medulloblastoma ^Q
Masoaka staging ^Q	Thymoma ^Q
Shimda index ^Q	Neuroblastoma ^Q
Reiss and Ellsworth classification	
Esson prognostic index ^Q	Retinoblastoma ^Q
Bloom-Richardson grading ^Q	CA breast ^Q
Naguchi classification ^Q	Adenocarcinoma lung ^Q
Sullivan modification of Macfale system ^Q	Adrenocortical carcinoma ^Q

Gleason	CA prostate ^Q
Nevine staging	CA GB ^Q
Duke staging	Colorectal carcinoma ^Q
Robson staging	RCC ^Q
Jackson	CA penis ^Q

147. Ans. b. Stage of the tumour at the time of diagnosis
 148. Ans. d. Gene expression profiling (Ref: Robbins 8/e p1084; Harrison 18/e p757; Schwartz 9/e p453; Sabiston 19/e p842-845; Bailey 26/e 816, 25/e p838)

Molecular classification of breast cancer is based on gene expression profiling.

- "Gene expression profiling, which can measure the relative quantities of mRNA for essentially every gene, has identified five major patterns of gene expression in the NST group: luminal A, luminal B, normal, basal-like, and HER2 positive. These molecular classes correlate with prognosis and response to therapy, and thus have taken on clinical importance." —Robbins 8/e p1084
- "One of the most exciting aspects of breast cancer biology has been its recent subdivision into at least five subtypes based upon gene expression profiling." - Harrison 18/e p757

Luminal criteria	
Type	Properties
Luminal A	ER and PR +ve, Her-2-neu –ve ^Q
Luminal B	ER, PR and Her-2-neu +ve (Triple positive) ^Q
Normal breast-like	Well-differentiated, ER-positive
Basal cell type	Triple negative, positive for myoepithelial markers ^Q (basal keratins, P-cadherin, p63, or laminin), CK-5, 6 and 17, EGFR
Her-2 type	Her-2-neu +ve, ER and PR –ve ^Q

Immunohistochemistry in CA Breast

- **Most widely used test for ER and PR receptor status^Q**
- Immunohistochemistry analysis of **heat-treated paraffin sections (of tumor tissue)** has largely superseded ELISA ligand-binding assay.
- **ER and PR positive status (>10 fmol on ELISA; >15 H-score on Immunohistochemistry)^Q predict improved response to endocrine treatment, time to relapse and overall survival^Q.**

Heat Map

- **Portrayal of global gene expression^Q is called heat map**
- This illustration provides an **unbiased look at breast cancer according to gene expression^Q**

149. Ans. c. Tumour tissue (Ref: Schwartz 9/e p453; Sabiston 19/e p842-845; Sabiston 19/e p844; Bailey 26/e p816, 25/e p838)

150. Ans. a. (Chemotherapy in hormone receptor positive patients) (Ref: Harrison 19/e p528; <http://www.oncotypedx.com/http://education.nccn.org/node/11346>. <http://www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=291504>)

Oncotype DX may be used to guide chemotherapy decisions among certain women with:

- Node-negative^Q
- Hormone receptor-positive^Q
- HER2-negative breast cancer^Q

Oncotype DX

- **Oncotype DX is a genomic test that predicts the likelihood of a cancer recurrence, the likelihood of benefit from chemotherapy, and the likelihood of survival in patients with newly diagnosed breast cancer that has not spread to the lymph nodes (node-negative) and is hormone receptor-positive.**
- Oncotype DX evaluates the **activity of 21 genes** from a sample of the patient's cancer to **determine the patient's Recurrence Score.**
- The **Recurrence Score** ranges from 0 to 100, with a **higher score indicating a greater risk of recurrence.**
- The **Oncotype DX diagnostic tests help individualize treatment planning for breast, colon and prostate cancer patients.**

Oncotype DX may be used to guide chemotherapy decisions among certain women with:

- Node-negative^Q
- Hormone receptor-positive^Q
- HER2-negative breast cancer^Q

For Breast Cancer	For Colon Cancer	For Prostate Cancer
<ul style="list-style-type: none"> • The Oncotype DX® Breast Cancer Assay can help physicians and patients decide on the best course of treatment. • For invasive breast cancer, the Oncotype DX Breast Cancer Assay predicts chemotherapy benefit and the likelihood of distant breast cancer recurrence. • The Oncotype DX Breast Cancer Assay for DCIS patients predict the risk of local recurrence. • Even when traditional measures seem conclusive, Oncotype DX Recurrence Score can lead to a different approach. 	<ul style="list-style-type: none"> • The Oncotype DX® Colon Cancer Assay quantifies recurrence risk in stage II and stage III colon cancer, beyond traditional qualitative measures. • This enables an individualized approach to treatment planning. • The Oncotype DX test measures a group of cancer genes in the tumor, providing a quantitative Recurrence Score result beyond traditional measures so physicians and patients can have a more complete discussion of recurrence risk. 	<ul style="list-style-type: none"> • The Oncotype DX Prostate Cancer Assay harnesses the power of genomics to provide a more precise and accurate assessment of risk based on individual tumor biology. • Using a minimal tissue sample from a needle biopsy, the test builds on traditional clinical pathologic factors to provide additional, clinically relevant insight into the underlying prostate tumor biology, enabling physicians and their patients to make treatment decisions with greater confidence.

The Oncotype DX, PAM50, and Mamma Print are multigene tests that are being used clinically for early-stage breast cancer to predict recurrence risk and guide adjuvant chemotherapy decisions.

Name of test	Brief description	Scoring/Measurement	Tissue needed
Oncotype DX	A genomic test that uses a 21-gene assay to provide an individual, quantitative assessment of the likelihood of disease recurrence.	Recurrence Score, a number between 0 and 100 that correlates to a specific likelihood of breast cancer recurrence within 10 years of initial diagnosis	Fixed-tissue blocks

Mamma Print	A unique 70-gene assay that has the ability to identify which early-stage breast cancer patients are at risk of distant recurrence following surgery, independent of Estrogen Receptor status and any prior treatment.	Low risk or high risk	Paraffin embedded or fresh tissue
PAM50	A 50-gene test in development that is designed to be performed in local routine hospital pathology laboratories and has been optimized to separate intrinsic disease subtypes that are used to generate a ROR score	Risk of Recurrence (ROR) score	Fixed-tissue blocks

COMPLICATIONS OF MASTECTOMY

151. Ans. a. Lymphedema (Ref: Schwartz 9/e p461; Sabiston 19/e p852-853; Bailey 26/e p813, 25/e p842)

Complications of Mastectomy
<ul style="list-style-type: none"> Seroma <ul style="list-style-type: none"> MC complication^Q, beneath skin flaps and axilla, occurs in 30% cases Catheter is retained until drainage is <30 ml/day Wound infection <ul style="list-style-type: none"> Majority are due to skin flap necrosis Lymphedema <ul style="list-style-type: none"> Occurs less frequently with the standard axillary dissections. Extensive LN dissection, radiation therapy, presence of positive LNs, obesity are predisposing factors^Q. Injury to Long Thoracic (Motor) Nerve <ul style="list-style-type: none"> Seen in 10% of all cases. Result in a palsy of the Serratus anterior muscle (classical winged scapula) Injury to Thoracodorsal Nerve: <ul style="list-style-type: none"> Leads to palsy of the latissimus dorsi muscle. Redundant Axillary Fat Pad

152. Ans. d. Angiosarcoma (Ref: Schwartz 9/e p469; Sabiston 19/e p845; Bailey 26/e p816, 25/e p845)

ANGIOSARCOMA

- Classified as **de novo**, as **postradiation**, or as arising in **association with postmastectomy lymphedema**.
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after radical mastectomy. (Stewart-Treves Syndrome)^Q
- Angiosarcoma is now the preferred name.
- The **average interval** between MRM or radical mastectomy and the development of an angiosarcoma is **10.5 years^Q**.
- 60% of women** developing this cancer have a **history of adjuvant radiation therapy^Q**.

Clinical Features

- Acute worsening of edema**
- Appearance of **sub-cutaneous nodules** with propensity towards **hemorrhage and ulceration**

Radiation-Induced Angiosarcoma	Angiosarcoma (in the absence of previous radiation therapy or surgery)
<ul style="list-style-type: none"> Reddish brown to purple raised rash within the radiation portals and on the skin of the breast 	<ul style="list-style-type: none"> May form a mass within the parenchyma of the breast

Treatment

- Pre-operative chemotherapy and radiotherapy** followed by **surgical excision (radical amputation)^Q**
- Associated with **poor prognosis^Q**
- Forequarter amputation** may be necessary to palliate the ulcerative complications and advanced lymphedema.

153. Ans. c. Lymphosarcoma

154. Ans. b. Intercostobrachial neuralgia (Ref: Medical Care of Cancer Patients by Sai-Ching Jim Yeung, Carmen P. Escalanate, Robert F)

POST-MASTECTOMY PAIN

- The breast, axilla and upper arm are innervated by variety of nerves; the lateral cutaneous branch of T2 (**intercostobrachial nerve**), T3 and T4 provides innervation to the anterior chest wall and upper back, the torso and nipple.
- Sympathetic innervation of the cutaneous structures of the breast is provided by the medial and lateral branches of the ventral ramus of 3rd to 6th intercostal nerves.
- While both nociceptive pain (due to damage of muscle and ligaments) and neuropathic pain can occur after surgery for breast cancer, **neuropathic pain is more likely to persist after wound healing** has occurred.

Four Pain Syndromes have been distinguished

- Phantom Breast Pain:** Painful (often knife like or shooting) sensation that the removed breast is still present
- Intercostobrachial neuralgia:** Usually known as **post-mastectomy pain syndrome (PMP)**, consists of **pain in axilla, medial upper arm and anterior chest wall** and is often caused by nerve damage during axillary node dissection.
- Neuroma Pain:** Can occur from scars from either mastectomy or lumpectomy but is more common if surgery is followed by radiotherapy.
- Other Nerve Injury Pain:** Can occur even if intercostobrachial nerve is spared and is more common in breast reconstruction and implants.

BREAST RECONSTRUCTION

155. Ans. d. Transverse rectus abdominis (Ref: Schwartz 10/e p549-550, 9/e p462-463; Sabiston 19/e p871-875; Bailey 26/e p816-817, 25/e p845)

Breast Reconstruction		
Autogenous	Alloplastic	Combined
<ul style="list-style-type: none"> TRAM flap (MC)^Q Lattisimus dorsi flap^Q Gluteal flap Ruben's flap^Q Thoracoepigastric flap Lateral thigh flap 	<ul style="list-style-type: none"> Silicone gel implant^Q Silicone implant with saline refill^Q 	<ul style="list-style-type: none"> Lattisimus dorsi flap with implant^Q TRAM flap with implant^Q

- Placement of the **implant in a submuscular plane** beneath the **pectoralis major^Q**, **superior portion** of the **rectus abdominis**, and **serratus anterior muscles** provides **better protection** against **implant extrusion**, as well as **decreased risk** for **capsular contracture** and **implant displacement^Q**

156. Ans. b. TRAM (Ref: Schwartz 10/e p549-550, 9/e p462-463; Sabiston 19/e p871-875; Bailey 26/e p816-817, 25/e p845)

Common Reconstructive Options after Mastectomy		
Type	Advantages	Disadvantages
Implant	One stage procedure, minimal prolongation, hospitalization, or recovery, low cost	Poor symmetry ^Q if skin removed or in large ptotic breasts. Capsular contracture, leakage, rupture ^Q possible.
Tissue expander	Short operative time, hospitalization, recovery not prolonged, low cost	Multiple physician visits post-op. Poor symmetry large or ptotic breasts. Capsular contracture, leakage rupture ^Q possible.
Latissimus dorsi flap	Short operative time, hospitalization, recovery not prolonged, low cost	Donor site scar ^Q Usually requires an implant ^Q Moderate prolongation hospitalization and recovery.
TRAM flap	Natural contour. Good match for large or ptotic breasts. Abdominoplasty.	Donor site scar ^Q Fat necrosis, flap loss possible. Abdominal wall weakness and hernia ^Q . Significant prolongation hospitalization plus recovery.

- MC method of breast reconstruction: Implants (silicon implants)^Q
- Surgical breast reconstruction should **never** be done prior to RT^Q.

157. Ans. c. Pectoralis major myocutaneous flap

158. Ans. c. Transversus rectus abdominis muscle flap

INFLAMMATORY CARCINOMA BREAST

159. Ans. e. Mastitis carcinomatosa (Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p864-865)

- MC type of CA breast: **Invasive ductal carcinoma**^Q
- Most malignant type of CA breast: **Inflammatory breast cancer**^Q

160. Ans. None (Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p864-865)

INFLAMMATORY BREAST CARCINOMA (MASTITIS CARCINOMATOSA)

- IBC (stage IIIB) accounts for <3% of breast cancers.
- Characterized by the skin changes of **brawny induration**, **erythema** with a raised edge, and **edema** (rapid onset peau d'orange) involving >33% of skin of breast^Q.

Pathology

- Permeation of the **dermal lymph vessels** by **cancer cells** is seen in **skin biopsy** specimens^Q.
- There **may be** an associated **breast mass**^Q.

Clinical Features

- Characterized by the skin changes of **brawny induration**, **erythema** with a raised edge, and **edema** (peau d'orange)^Q.
- IBC may be **mistaken** for a **bacterial infection**^Q of the breast.
- More than 75% of women present with **palpable axillary lymphadenopathy**^Q
- **Distant metastases at diagnosis** in 25% of white women with IBC.

Treatment

- Multimodal approach (NACT + Mastectomy + RT ± Hormonal therapy)^Q
- **Chest wall**, **supraclavicular**, **internal mammary** and **axillary** lymph node basins receive **adjuvant radiation therapy**.
- This **multimodal approach** results in **5-year survival rates** that approach 30%^Q.

Inflammatory Breast Cancer	Non-inflammatory Breast Cancer
• Dermal lymph vessel invasion ^Q is present with or without inflammatory changes.	• Inflammatory changes are present without dermal lymph vessel invasion.
• Cancer is not sharply delineated .	• Cancer is better delineated .
• Erythema and edema frequently involve >33% of the skin over the breast ^Q .	• Erythema is usually confined to the lesion , and edema is less extensive.
• Lymph node involvement is present in >75% of cases ^Q .	• Lymph nodes are involved in approximately 50% of the cases.
• Distant metastases are present in 25% of cases.	• Distant metastases are less common at presentation.
• Distant metastases are more common at initial presentation ^Q .	

- Both inflammatory breast cancer and Paget's disease may or may not be associated with breast mass.

MALE BREAST CANCER

161. Ans. a. Estrogen receptor positive, b. Associated with gynaecomastia

(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p1935; Bailey 26/e p819, 25/e p848)

CARCINOMA OF MALE BREAST

- Peak in **sixth decade**^Q of life, accounts for less than 1% of all cases of breast cancer.
- Most common variety is **infiltrating ductal carcinoma**^Q.

- Male breast cancer is **preceded** by **gynecomastia** in 20% of men^Q.
- **Hormone receptor positive**: 80%; **Her-2-neu positive**: 35%

- **Lobular carcinoma** (both in-situ and invasive) is **rarely seen** due to **absence of lobules** in males.

Predisposing factors

- Excess endogenous or exogenous **estrogen** (Testicular disease, **infertility**, **obesity**, **cirrhosis**)^Q
- **Radiation therapy**, **Klinefelter's syndrome** and **testicular feminizing syndromes**^Q.
- **BRCA2 mutations**^Q

- **Gynecomastia** is **not a risk factor** for carcinoma male breast^Q.

Clinical Features

- The median age at diagnosis is 68 years
- Most common presentation is as **lump**^Q.
- Local pain, axillary adenopathy, nipple retraction, ulceration, bleeding, and discharge.

- **Breast cancer in men more commonly involves the pectoralis major muscle**^Q due to scanty breast tissue.

Diagnosis

- Evaluation includes **breast imaging** studies and diagnostic **needle** or **surgical biopsy**.

Treatment

- The treatment of male breast cancer is **surgical** (Most common procedure: **MRM**)^Q
- **Adjuvant radiation therapy** is in **high risk cases** for local-regional recurrence.
- **Eighty percent** of male breast cancers are **hormone receptor positive**, and adjuvant **tamoxifen** is considered.

Prognosis

- **Stage >Lymph node status** is the **best prognostic indicator**^Q as in female breast carcinoma.
- **Stage by stage prognosis** is **same** as **female CA breast**^Q

162. Ans. a. Gynaecomastia is a predisposing factor (Ref: Schwartz 9/e p468; Sabiston 19/e p865-866; Bailey 25/e p848)
- Male breast cancer is preceded by gynecomastia in 20% of men^Q.
163. Ans. b. Estrogen receptor positive, c. History of gynaecomastia may be present, e. Undescended testis is a risk factor
164. Ans. c. Most commonly it is infiltrating lobular carcinoma
165. Ans. d. BRCA-2 mutation is associated with increased risk
166. Ans. c Invasive ductal cancer

CARCINOMA BREAST IN PREGNANCY

167. Ans. d. All of the above (Ref: Schwartz 10/e p554, 9/e p467; Sabiston 19/e p2035-2037; Bailey 26/e p818, 25/e p846)

BREAST CANCER DURING PREGNANCY

- Occurs in 1 of every 3000^Q pregnant women
- **MC non-gynecologic malignancy** associated with **pregnancy**^Q.
- **Ductal carcinoma** is **MC type**, accounting for 75-90%^Q of breast cancer in pregnancy.

Clinical Features

- Presents as **painless palpable mass**^Q with or without nipple discharge
- **Axillary LN metastases** in upto 75% patients
- Approx. <25% **nodules** developing during **pregnancy** and **lactation** will be **cancerous**^Q
- **Present at a later stage** of disease because breast changes occurring in hormone-rich environment of pregnancy obscure early cancer

Diagnosis

- **USG** and **needle biopsy**^Q are used for diagnosis
- **Mammography** is rarely indicated due to its **decreased sensitivity** during **pregnancy** and **lactation**

Treatment: Mainstay of therapy is surgical resection

Stage I and II	Mastectomy with axillary dissection ^Q
LABC	NACT after 1 st trimester + MRM in 2 nd trimester + RT after delivery ^Q

LABC in Pregnancy

- **MRM** can be performed during **first and second trimester** (increased risk of spontaneous abortion after first-trimester anesthesia), **chemotherapy after first trimester** and **radiotherapy after delivery**.
- **Chemotherapy** during **first trimester** carries a risk of **spontaneous abortion** and **12% risk of birth defects, given after first trimester**.
- No evidence of teratogenicity by chemotherapy during second and third trimester.

Remember

- Breast cancer in pregnancy have **prognosis stage by stage similar** to that of non-pregnant patient
- **Elective termination of pregnancy** to receive appropriate therapy without the risk for fetal malformation is **no longer routinely recommended** because no improvement in survival has been demonstrated.

MONDOR'S DISEASE

168. Ans. a. Thrombophlebitis of the superficial veins of breast

(Ref: Schwartz 10/e p507, 9/e p433; Sabiston 19/e p1594; Bailey 26/e p805, 25/e p833)

MONDOR'S DISEASE

- A variant of **thrombophlebitis** involving the **superficial veins** of the **anterior chest wall**^Q and breast.
- Also known as "**string phlebitis**," a thrombosed vein presenting as a **tender, cord-like structure**^Q.
- Frequently involved veins: **Lateral thoracic vein, thoracoepigastric vein**, superficial epigastric vein.
- This **benign, self-limited disorder** is not indicative of a cancer.

Clinical Features

- **Acute pain** in the **lateral aspect** of the **breast** or the **anterior chest wall**^Q.
- A **tender, firm cord** is found to follow the distribution of one of the major superficial veins.

Diagnosis

- When the diagnosis is **uncertain**, or when a **mass** is present near the tender cord, **biopsy** is indicated.

Treatment

- NSAIDs and application of **warm compresses**^Q along the symptomatic vein with **restriction of motion** and **brassiere support** of the breast
- Usually **resolves** within **4–6 weeks**.
- When symptoms **persist** or are **refractory to therapy**, **excision** of the involved vein segment

169. Ans. a. Superficial thrombophlebitis, c. Cord like appearance of subcutaneous veins

170. Ans. c. Veins of the breast

DUCTAL ANOMALIES

171. Ans. b. Microdochectomy (Ref: Bailey 26/e p802, 25/e p830)

DUCT PAPILLOMA

- Intraductal papilloma are true polyps of epithelium lined breast ducts.
- **Benign**^Q lesions (**not pre-cancerous**)
- **Mostly solitary**^Q, located under the areola (within 4–5 cm of nipple orifice)
- Generally **<1 cm**, can grow upto 4–5 cm

Clinical Features

- MC presentation: **Bloody nipple discharge**^Q
- Intraductal papilloma is MC cause of **bloody nipple discharge**^Q

Diagnosis

- Ductography: **Small filling defects**^Q surrounded by contrast media

Treatment

- **Microdochectomy**: Complete excision of the **involved duct** along with **tumor**^Q

172. Ans. a. Hadfield's operation (Ref: Bailey 26/e p805, 25/e p834)

DUCT ECTASIA (PERIDUCTAL MASTITIS)

- **Dilatation** of the **breast ducts**, which is often associated with **periductal inflammation**.
- Pathogenesis is obscure, **more common** in **smokers**^Q.

Pathology

- First stage in the disorder is a **dilatation** in **one or more** of the **larger lactiferous ducts**, which fill with a stagnant **brown** or **green secretion**^Q, this may discharge.
- These fluids then set up an **irritant reaction** in surrounding tissue leading to periductal **mastitis** or even abscess and fistula formation.
- **Dilatation** of the **breast ducts**, which is often associated with **periductal inflammation**.
- Pathogenesis is obscure, **more common** in **smokers**^Q.

Clinical Features

- **Nipple discharge** (of any colour), a **subareolar mass**, **abscess**, **mammary duct fistula** and/or **nipple retraction**^Q are the most common symptoms.

Diagnosis

- **Ductography:** Dilated cystic structure^Q in duct Ectasia
- In the case of a **mass** or **nipple retraction**, a **carcinoma** must be **excluded** by obtaining a **mammogram** and **negative cytology** or histology.

Treatment

- **Hadfield's operation^Q:** Excision of all of the major ducts
- Shave the back of the nipple to ensure that **all terminal ducts** are **removed** to prevent recurrence.
- **Cessation of smoking^Q** increases the chance of a long-term cure.
- Antibiotic therapy may be tried

173. Ans. d. Hadfield's operation

174. Ans. a. Duct ectasia

175. Ans. a. Nipple discharge

CYSTOSARCOMA PHYLLODES

176. Ans. a. Wide excision with a margin (Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p845; Bailey 25/e p836)

PHYLLODES TUMORS

- Tumors of mixed connective tissue and epithelium (biphasic proliferation of **stroma** and mammary **epithelium**)^Q
- Also known as **serocystic disease of Brodie^Q**
- Classified as benign, borderline, or malignant.
- **Borderline tumors** have a greater potential for **local recurrence**.

Pathology

- Sharply demarcated from the surrounding breast tissue, which is compressed and distorted.
- **Connective tissue** composes the **bulk** of these tumors, which have mixed gelatinous, solid, and cystic areas.
- **Cystic areas** represent sites of **infarction** and **necrosis**.
- Gross cut tumor surface: **Classical leaf-like (phyllodes) appearance^Q**.
- **Stroma** of a phyllodes tumor has **greater cellular activity** than fibroadenoma.

Stromal cells of fibroadenomas	Either polyclonal or monoclonal^Q
Stromal cells of phyllodes tumors	Always monoclonal^Q

- Most **malignant phyllodes tumors** contain **liposarcomatous** or **rhabdomyosarcomatous elements** rather than fibrosarcomatous elements^Q.
- Evaluation of the **number of mitoses** and **presence or absence of invasive foci** at the tumor margins may help to identify a **malignant tumor^Q**.

Clinical Features

- **Smooth, rounded**, usually **painless** multinodular lesions
- Average **age: 4th decade**.
- Large, mostly **massive size** but always **mobile over chest wall^Q**
- **Bosselated surface** with **pressure necrosis of overlying skin^Q**
- The diagnosis is suggested by the **larger size**, a history of **rapid growth^Q**, and occurrence in **older patients**.
- **Differentiated from carcinoma by:** No fixity to skin and pectoralis, no nipple retraction, no LN involvement^Q

Diagnosis

- Mammographic evidence of **calcifications** and **morphologic evidence of necrosis** do not distinguish between benign, borderline, and malignant phyllodes tumors.
- **Ultrasound:** Discrete structure with **cystic spaces**
- **Diagnosis** is best made by **biopsy^Q**

Treatment

Small phyllodes tumors	Wide local excision^Q
Large phyllodes tumors	Mastectomy^Q
Phyllodes tumor with suspicious malignant elements	Re-excision of biopsy site to ensure complete excision of tumor with a 1-cm margin

- **Axillary dissection** is **not recommended** because axillary LN metastases rarely occur^Q.
- **Metastases** from malignant phyllodes tumors occur **via hematogenous spread**, with common sites including **lung, bone, abdominal viscera** and **mediastinum**.

177. Ans. a. Simple mastectomy
 179. Ans. c. Cystosarcoma phyllodes
 181. Ans. b. Phyllodes tumor
 178. Ans. c. It is usually bulky and may fungate through the skin
 180. Ans. d. All of the above

GYNAECOMASTIA

182. Ans. c. Cryptorchidism (Ref: Schwartz 10/e p505-506, 9/e p430-432; Sabiston 19/e p828; Bailey 25/e p847)

PHYSIOLOGIC GYNecomastia

- Excess of circulating **estrogens** in relation to circulating testosterone: Neonatal period, adolescence and senescence.

Neonatal gynecomastia

- Action of **placental estrogens**^Q on neonatal breast tissues
- Usually disappear in few weeks

Adolescent gynecomastia

- Excess of **estradiol** relative to testosterone^Q
- Usually **unilateral**, asymmetrical if bilateral, occurs between 12–15 years^Q
- Regresses spontaneously^Q within 3 years

Senescent Gynecomastia

- Circulating testosterone level falls resulting in **relative hyperestrinism**^Q
- Usually **bilateral**^Q

Pathological Gynecomastia

- Causes: **Idiopathic (MC)**^Q, Relative estrogen excess, Absolute estrogen excess, Drugs

Relative Estrogen Excess

- Occurs because of **failure of testosterone synthesis or action**^Q

Congenital Defects	Secondary Testicular Failure
• Anorchia	• Viral orchitis (mumps)
• Klinefelter's syndrome	• Trauma
• Androgen resistance	• Castration
– Testicular feminization syndrome	• Leprosy
– Reifenstein syndrome	• Myotonic dystrophy, spinal cord injury
• Defects in testosterone synthesis	• Renal failure

Absolute Estrogen Excess

1. Increased Testicular Estrogen Secretion: <ul style="list-style-type: none"> Testicular tumors (Leydig cell, Sertoli cell, granulosa/theca cell tumors)^Q Bronchogenic carcinoma and TCC of urinary tract (secrete hCG)^Q True hermaphroditism (Both testicular and ovarian components are active)
2. Increased substrate for Peripheral Aromatization: <ul style="list-style-type: none"> Adrenal carcinoma and congenital adrenal hyperplasia^Q (increased adrenal androgens) Exogenous androgen administration Cirrhosis^Q (decreased hepatic catabolism) Starvation with refeeding (decreased hepatic catabolism) Thyrotoxicosis (increased production by adrenals)
3. Increase in Extraglandular aromatization

Drugs

Estrogen Related Drugs	Drugs Enhancing Endogenous Estrogen Formation	Drugs inhibiting Testosterone synthesis/ action (MACKS)	Unknown Mechanism (CBI inquires PMT)
<ul style="list-style-type: none"> DES^Q OCPs^Q Digitalis^Q 	<ul style="list-style-type: none"> Gonadotropins^Q Clomiphene^Q 	<ul style="list-style-type: none"> Metronidazole^Q Alkylating agents^Q Cimetidine^Q Cisplatin^Q Ketoconazole^Q Spirolactone^Q Flutamide^Q 	<ul style="list-style-type: none"> Captopril^Q CCB^Q Busulphan^Q INH^Q Penicillamine^Q Methyldopa^Q TCA^Q

183. Ans. a. Subcutaneous mastectomy is the initial treatment of choice (Ref: Schwartz 10/e p505-506, 9/e p430-432; Sabiston 19/e p828; Bailey 25/e p847; Williams Endocrinology 10/e p741)

GYNECOMASTIA

- Enlarged male breast due to growth of **ductal tissue** and **stroma**^Q
- Basic mechanism: **Excess of estrogen** (relative or absolute)^Q

Clinical Classification of Gynecomastia	
Grade I	Mild breast enlargement without skin redundancy
Grade IIa	Moderate breast enlargement without skin redundancy
Grade IIb	Moderate breast enlargement with skin redundancy
Grade III	Marked breast enlargement with skin redundancy and ptosis , which simulates a female breast

Diagnosis

- In the **nonobese male**, breast tissue measuring at **least 2 cm** in diameter^Q

Treatment

- Most cases resolve **spontaneously**^Q
- **Non-surgical management**: Correction of underlying cause, cessation of offending drug
- **Pharmacological agents**: Antiestrogens (Tamoxifen), Aromatase inhibitors and danazol to inhibit gonadotropin secretion

Indications of Surgery in Gynecomastia

1. Gynecomastia of **longer duration** (>1 year)^Q
2. **Continued growth**^Q
3. **Psychological** or **cosmetic problem**^Q
4. **Tenderness**^Q
5. **Suspected malignancy**^Q

- Surgical Procedures: **Mastectomy**, **subtotal mastectomy**, **subcutaneous mastectomy**, **reduction mammoplasty**^Q.

Suction Assisted Lipectomy

- **Removes only adipose tissue**^Q, if performed as a sole method
- Performed as an **adjunct surgical procedure**^Q
- Use is limited in cases that are severe or in fibrous breasts
- **Reduces overall breast size** and may result improved appearance, but it **does not remove the glandular tissue** (does not correct gynecomastia)^Q
- **Most cases** of gynecomastia are **amenable** to **simple liposuction** with minimal glandular resection through **periareolar incision** as necessary^Q.

184. Ans. a. May be seen in Addison's disease, b. Usually unilateral in young males 185. Ans. d. Turner's syndrome
186. Ans. b. Incision along the areolar margin
187. Ans. a. Prolactinoma (Ref: Harrison 18/e p2889)

PROLACTINOMA

- Prolactinomas are essentially associated with **galactorrhea**, not the gynecomastia^Q.
- Gynecomastia does not result from either excess or deficiency of prolactin.

PAGET'S DISEASE OF NIPPLE

188. Ans. a. Intraductal carcinoma, b. Mastectomy needed c. Malignant (Ref: Schwartz 10/e p506-521, 9/e p444-445; Sabiston 19/e p865; Bailey 25/e p838)

PAGET'S DISEASE OF NIPPLE

- Chronic eczematous eruption of nipple which may progress to an ulcerated weeping lesion.
- Differentiated by superficial spreading melanoma by **CEA positivity**^Q

Histopathology

- Paget cell is **large**, pale staining with **round nuclei** and **large nucleoli**^Q
- Paget cells **spread into lactiferous sinuses**^Q under the nipple and upward to invade overlying epidermis of the nipple
- Paget cells **does not invade dermal basement membrane**^Q (carcinoma in situ)

Clinical Features

- Most (>97%) patients with Paget's disease have an **underlying ductal carcinoma**^Q (in situ or invasive)
- Paget's disease **may** (54%) or **may not** (46%) be accompanied by a **mass**^Q
- **Invasive breast cancer coexists** with Paget's disease in 93% of patients **with mass** and in 38% of patients **without mass**^Q

Diagnosis

- **Complete mammography** and **biopsy** is required to rule out occult multicentric disease
- **Biopsy showing Paget cell is diagnostic**^Q

Treatment

- Most commonly utilized procedure is **simple mastectomy**^Q
- Wide excision of nipple and areola to achieve clear margins + Radiotherapy + Axillary staging
- Lumpectomy + Radiotherapy + Axillary LN dissection

189. Ans. d. 1, 2, 3 and 4

191. Ans. b. Paget's disease

193. Ans. b. Abundant clear cytoplasm

195. Ans. a. 1% associated with underlying invasive carcinoma of breast

196. Ans. a. Usually bilateral

197. Ans. a. Paget disease of bone

190. Ans. c. May have underlying carcinoma

192. Ans. d. Cytology diagnostic

194. Ans. a. Always there is underlying carcinoma

MASTITIS AND BREAST ABSCESS198. Ans. d. All of the above (Ref: http://nobleboss.awardspace.com/mednotes/surgnotes/operativebreast_abscess.htm)**RETROMAMMARY BREAST ABSCESS**

- It may an **extension of Breast abscess, Empyema thoracis, Osteomyelitis** of the ribs^Q
- **No need to drain** retromammary abscess, **only conservative treatment**^Q

199. Ans. c. Lactation (Ref: Schwartz 10/e p506, 9/e p432; Sabiston 19/e p839; Bailey 25/e p832-833)

NONEPIDEMIC (SPORADIC) PUERPERAL MASTITIS

- **Involvement** of the **interlobular connective tissue** of the breast by an infectious process.
- The patient develops **nipple fissuring** and **milk stasis**, which initiate a **retrograde bacterial infection**^Q.
- **Emptying of the breast** using breast suction pumps **shortens** the **duration** of symptoms^Q and **reduces** the incidence of **recurrences**.
- The addition of **antibiotic therapy**^Q results in a satisfactory outcome in >95% of cases.

200. Ans. a. *S. aureus* (Ref: Schwartz 10/e p506, 9/e p432; Sabiston 19/e p839; Bailey 25/e p832-833)**BREAST ABSCESS**

- Typically seen in **staphylococcal infections**^Q
- Present with point tenderness, erythema, and hyperthermia
- **Related to lactation** and occur **within** the **first few weeks of breastfeeding**^Q.

- *S. aureus* are **transmitted** via **suckling neonate**^Q

Staphylococcal infections (MC)	Localized and situated deep in the breast tissues
Streptococcal infections	Diffuse superficial involvement

Diagnosis

- Preoperative **ultrasonography** is effective in **delineating the required extent** of the drainage procedure

Treatment

- Local wound care, including application of warm compresses, and the administration of IV antibiotics (penicillins or cephalosporins).
- **Drainage procedure** is best accomplished via **circumareolar incisions** or incisions **paralleling Langer's lines**^Q.
- **Biopsy of abscess cavity wall** at the time of incision and drainage to **rule out** underlying or coexisting **breast cancer** with **necrotic tumor**^Q.

ANDI FIBROADENOMA AND FIBROADENOSIS

201. Ans. d. Solitary mobile mass (Ref: Bailey 25/e p836; Schwartz 10/e p510, 9/e p433-434; Sabiston 19/e p827)

FIBROADENOMA

- MC benign tumor of female breast^Q
- MC age group: 15–30 years^Q
- Known as **breast mouse**^Q
- Etiology: **Increased sensitivity of focal areas of breast tissue to estrogen**^Q

Pathology

- **Encapsulated** spherical lesion, composed of **fibrous** and **glandular tissue**^Q
- Arise from interlobular stroma, stromal cells can be monoclonal or polyclonal

Types

- **Pericanalicular (Hard)**: Due to proliferation of connective tissue **inside** the **elastic lamina**
- **Intracanalicular (Soft)**: Due to proliferation of connective tissue **outside** the **elastic lamina**

Clinical Features

- **Painless**, slowly growing **solitary mobile lump** in the breast (**Breast mouse**)^Q

Diagnosis

- Characteristic **popcorn calcification**^Q on mammography
- IOC is FNAC^Q

Treatment

- **No treatment**^Q is necessary when diagnosis is confirmed.
- **Excision biopsy** is the treatment of choice for **suspicious lesion**^Q and for cosmetic indications.

202. Ans. c. Fibroadenosis (Ref: Schwartz 10/e p507, 9/e p433-435; Sabiston 19/e p827-828; Bailey 25/e p835)

- **Fibroadenosis** or **fibrocystic disease** is the cause of pre-menstrual fullness in breast in 21 years old unmarried female.
- Rest of the options are highly unlikely.

ABERRATIONS OF NORMAL DEVELOPMENT AND INVOLUTION

- ANDI classification encompasses all aspects of the breast condition, including pathogenesis and the degree of abnormality.

Early Reproductive Years

- **Fibroadenomas** in younger women aged **15 to 25 years**
- Nipple inversion is a disorder of development of the major ducts, which prevents normal protrusion of the nipple.
- Mammary duct fistulas arise when nipple inversion predisposes to major duct obstruction, leading to recurrent subareolar abscess and mammary duct fistula.

Later Reproductive Years

- **Cyclical mastalgia** and **nodularity** usually are associated with **premenstrual enlargement** of the breast and are regarded as normal.
- In epithelial hyperplasia of pregnancy, papillary projections sometimes give rise to bilateral bloody nipple discharge.

Involution

- **Macrocyts** are common, are often **subclinical**, and do not require specific treatment.
- **Sclerosing adenosis** is considered a disorder of both the proliferative and the involutional phases of the breast cycle.

- **Duct ectasia** (dilated ducts) and periductal mastitis are other important components.
- **Sixty percent** of women **70 years** of age exhibit some degree of **epithelial hyperplasia**.
- **Atypical** proliferative diseases include **ductal** and **lobular hyperplasia**, both of which display **some features** of **carcinoma in situ**.
- Women with **atypical ductal** or **lobular hyperplasia** have a **fourfold increase** in **breast cancer risk**.

ANDI Classification of Benign Breast Disorders

	Normal	Disorder	Disease
Early reproductive years (age 15–25 years)	Lobular development Stromal development Nipple eversion	Fibroadenoma ^Q Adolescent hypertrophy Nipple inversion	Giant fibroadenoma Gigantomastia Subareolar abscess Mammary duct fistula

Later reproductive years (age 25–40 years)	Cyclical changes of menstruation Epithelial hyperplasia of pregnancy	Cyclical mastalgia ^a Nodularity Bloody nipple discharge	Incapacitating mastalgia ^a
Involution (age 35–55 years)	Lobular involution Duct involution Dilatation Sclerosis Epithelial turnover	Macrocysts Sclerosing lesions Duct ectasia Nipple retraction Epithelial hyperplasia	Periductal mastitis Epithelial hyperplasia with atypia ^a

203. Ans. d. Aspiration is the treatment (Ref: Schwartz 10/e p51; Bailey 25/e p836)

BREAST CYST

- Occur most commonly in the **last decade of reproductive life**^o as a result of a non-integrated involution of stroma and epithelium.

Clinical Features

- Often **multiple**, may be **bilateral**^o and can mimic malignancy.
- Typically **present suddenly** and cause great alarm; **prompt diagnosis** and **drainage** provides **immediate relief**^o.

Diagnosis

- Diagnosis can be confirmed by **aspiration** and/or **ultrasound**^o.

Treatment

- Aspiration** for Solitary cyst: If they **resolve completely**, and if the fluid is **not blood-stained**, **no further treatment** is required (30% will **recur** and require **reaspiration**)^o
- Core biopsy** or **local excision**^o: If there is a **residual lump** or if the fluid is **blood-stained**, for **histological diagnosis** (exclude cystadenocarcinoma, which is more common in elderly women)

204. Ans. b. Fibroadenoma

205. Ans. b. Tightly arranged ductal epithelial cells with dyscohesive bare nuclei (Ref: Winfred Grays diagnostic cytopathology 2/e p279-280)

Non-tender, firm and mobile breast lump in a female of age 17 years is suggestive of fibroadenoma, in which tightly arranged ductal epithelial cells with dyscohesive bare nuclei are seen on FNAC. (AIIMS May 2013 repeat)

Fibroadenoma:

- Diagnostic findings on needle biopsy consist of:
 - Abundant stromal cells** which appear as **bare bipolar nuclei**
 - Sheets of fairly uniform-size epithelial cells** that are **typically arranged in either an antler like pattern or a honeycomb pattern**.
 - Foam cells and apocrine cells may also be seen, although these are less diagnostic features.

MISCELLANEOUS

206. Ans. d. Forerunner of breast abscess (Ref: Bailey 25/e p830)

CRACKED NIPPLE

- This may occur **during lactation** and be the **forerunner of acute infective mastitis**^o.
- If the **nipple becomes cracked during lactation**, it should be **rested for 24–48 hours** and the breast should be **emptied with a breast pump**^o.
- Feeding should be resumed as soon as possible.

207. Ans. a. Axillary, b. Supraclavicular, c. Internal mammary

Important Lymph Nodes	
Rotter's nodes ^a	Interpectoral nodes (CA breast) ^a
Rouvier nodes ^a	Retropharyngeal nodes (CA Nasopharynx) ^a
Delphian nodes ^a	Pre-cricoid lymph nodes ^a
Irish nodes ^a	Nodes in left axilla (CA stomach) ^a
Sister Mary Joseph nodes ^a	Periumbilical metastatic cutaneous nodules
Virchow nodes ^a	Left supraclavicular node ^a
Cloquet node ^a	Femoral canal node ^a
LN of Lund ^a	Cystic lymph node ^a

208. Ans. b. Family history of CA breast

209. Ans. c. Microdochotomy

210. Ans. a. Excision of a lump

- **Lumpectomy (Tylectomy):** Surgical procedure designed to remove a discrete lump

211. Ans. c. Associated with prolactinoma and other endocrinopathies, d. Surgery is done, e. Hypothyroidism can cause galactorrhoea (Ref: Harrison 17/e p2204-2205; Dutta Gynecology 5/e p548-549)

GALACTORRHEA

- Secretion of **milk looking discharge** from one or both breasts unrelated to pregnancy^Q is called galactorrhea.
- Physiological galactorrhea is the continued production of milk after lactation has ceased and menses resumed and is often caused by continued mechanical stimulation of the nipple.
- In both **men** and **women**^Q, galactorrhea may **vary in colour and consistency**.
- Galactorrhoea is commonly associated with **prolactinoma**^Q.

Treatment

- Treatment is aimed at **normalizing prolactin level**^Q.
- **Bromocriptine**^Q (dopamine agonist) is the **drug of choice**.
- **Surgery** is considered when there is **failure of medical therapy**^Q (Trans-nasal trans-sphenoidal excision of pituitary adenoma is done^Q)

212. Ans. d. Schirrhous carcinoma (Ref: Norman Browns/e277)

Causes of Massive Breast Enlargement

1. Benign hypertrophy ^Q (usually bilateral)	4. Sarcoma ^Q
2. Cystosarcoma phyllodes ^Q	5. Colloid carcinoma ^Q
3. Giant fibroadenoma ^Q	6. Filarial elephantiasis ^Q

213. Ans. b. Virginal hypertrophy (Ref: CPDT 16/e p1128)

VIRGINAL HYPERTROPHY

- Massive enlargement of usually both breasts^Q
- It can also be unilateral
- Usually occurs due to an alteration in the normal sensitivity of the breast to estrogenic hormones^Q
- Treatment: Reduction mammoplasty^Q

214. Ans. e. None of the above (Ref: NMS surgery 4/e p456)

Haagensen's Criteria of Inoperability

1. Extensive edema of the breast ^Q	5. A parasternal tumor ^Q , indicating spread to the internal mammary LNs
2. Satellite nodule ^Q of carcinoma	6. Edema of arm ^Q
3. Inflammatory carcinoma ^Q	7. Distant metastasis ^Q
4. Supraclavicular metastasis ^Q	

215. Ans. c. Pectoral (Ref: Bailey 25/e p831)

AMAZIA

- Congenital absence of the breast^Q may occur on one or both sides.
- It is sometimes associated with absence of the sternal portion of the pectoralis major (Poland's syndrome)^Q.
- It is more common in males^Q.

216. Ans. b. Well encapsulated, d. Mastectomy is mainstay treatment (Ref: Cancer of Breast by Donegau 5/e p933-936; Breast Cancer by Roses 2/e p207-208)

BREAST LEIOMYOSARCOMA

- Leiomyosarcomas are malignant tumors^Q composed of cells showing smooth muscle features
- Locally aggressive tumor and hematogenous metastasis^Q

- Palpable axillary lymphadenopathy is **uncommon**^Q and when encountered usually represents **reactive** LNs **uninvolved** by metastatic disease^Q
- A clinically negative axilla in presence of **large tumor** may be indicative of breast sarcoma
- Tumor is **well circumscribed** or **encapsulated**^Q

Treatment

- Simple mastectomy is **gold standard**^Q of treatment
- Axillary lymph node dissection is **not indicated**^Q
- Postoperative radiation may be used in patient undergoing mastectomy because chest wall recurrence are observed

217. Ans. a. Axilla (Ref: Bailey 26/e p803, 25/e p831)

218. Ans. b. Chronic areolar abscess (Ref: Schwartz 10/e p506, 9/e p433)

ZUSKA'S DISEASE (RECURRENT PERIDUCTAL MASTITIS)

- Condition of **recurrent retroareolar infections** and **abscesses**
- **Smoking** has been implicated as a **risk factor**
- Managed symptomatically by **antibiotics** with **incision** and **drainage**

Prognosis

- The prognosis is favorable, with 5- and 10-year survival rates of **74** and **51%**, respectively.

219. Ans. d. Parasternal (Ref: Bailey 25/e p839)

220. Ans. b. USG (Ref: Sutton's Radiology 7/e p1456; Schwartz 9/e p467; Sabiston 19/e p2035-2037; Bailey 25/e p846)

INDICATIONS OF BREAST ULTRASOUND: (SUTTON'S RADIOLOGY 7/E P1456)

- **Symptomatic breast lump** in women <35 years
- **Breast lump during lactation and pregnancy**
- Assessment of mammographic abnormality
- Assessment of MRI or scintimammography detected lesions (± further mammographic views)
- **Clinical breast mass with negative mammogram**
- **Breast inflammation**
- Augmented breast (together with MRI)
- Breast lumps in males (together with MRI)
- **Guidance of needle biopsy or localization**
- Follow-up of breast carcinoma treated with adjuvant chemotherapy

221. Ans. c. Intercostobrachial nerve

222. Ans. b. i.e., Isosulfan blue dye (Ref: Schwartz 9/e p259)

Lymphatic mapping is performed by using isosulfan blue dye, technetium-labeled sulfur colloid albumin or a combination of both

223. Ans. b. Breast mass but no lymph node palpable. (Ref: Schwartz 9/e p258)

MULTIPLE CHOICE QUESTIONS

PAPILLARY CARCINOMA

1. A 35-years old female presented with a swelling in the neck for the past 2 months, she had the treatment for Hodgkin's lymphoma when she was 22 years with irradiation. On examination, her vitals were normal, there was a single, firm, irregular nodule, moving with deglutition in the left side of midline. Clinical examination also revealed a single node in the left side of the neck. The most likely clinical diagnosis of this condition is: (COMEDK 2011)
 - a. Recurrence of lymphoma
 - b. Malignant goiter
 - c. Benign multinodular goiter
 - d. Toxic nodular goiter
2. Most probable pathological diagnosis would be: (COMEDK 2011)
 - a. Anaplastic carcinoma
 - b. Follicular carcinoma
 - c. Medullary carcinoma
 - d. Papillary carcinoma
3. The FNAC of the lesion should reveal: (COMEDK 2011)
 - a. 'Orphan-Annie eye' nucleus cells
 - b. Amyloid deposits
 - c. Epitheloid cells and giant cells
 - d. Follicular cells
4. The ideal treatment of the above condition would be:
 - a. Total thyroidectomy with lymph nodal dissection of the same side (COMEDK 2011)
 - b. Radiotherapy
 - c. Lobectomy
 - d. Lobectomy with isthmusectomy
5. About papillary carcinoma what is/are true? (PGI Dec 2008)
 - a. Often encapsulated
 - b. Prognosis is bad
 - c. Lymph node metastases is common
 - d. Can metastasize to lung
 - e. Multiple foci of tumour is seen
6. Variant of papillary carcinoma thyroid: (PGI June 2007)
 - a. Medullary
 - b. Warthin
 - c. Columnar
 - d. Insular
 - e. Diffuse sclerosing
7. Papillary carcinoma thyroid: (PGI June 2007)
 - a. Most common thyroid cancer
 - b. Psammoma bodies seen
 - c. Encapsulated
 - d. Blood borne metastasis is common
8. Which of the following would be the best treatment for a 2 cm thyroid nodule in a 50 year old man with FNAC revealing it to be a papillary carcinoma? (AIIMS May 2011)
 - a. Hemithyroidectomy
 - b. Total thyroidectomy with left sided modified neck dissection
 - c. Near total thyroidectomy with radiotherapy
 - d. Hemithyroidectomy with modified neck dissection
9. Psammoma bodies may be seen in all of the following, except: (All India 2011)
 - a. Follicular carcinoma of thyroid
 - b. Papillary carcinoma of thyroid
 - c. Meningioma
 - d. Serous cystadenocarcinoma of ovary
10. Features of papillary carcinoma includes: (PGI May 2011)
 - a. FNAC easy
 - b. Almost always unifocal
 - c. Psammoma body
 - d. Spread to cervical LN
 - e. Bad prognosis
11. About papillary carcinoma true statement is/are: (PGI Nov 2010)
 - a. Radiation is a risk factor
 - b. Multifocal
 - c. Hematogenous spread is common
 - d. Distant metastasis is seen
12. Most common thyroid malignancy is: (DNB 2012, MHPGMCET 2002)
 - a. Anaplastic carcinoma
 - b. Follicular carcinoma
 - c. Medullary carcinoma
 - d. Papillary carcinoma
13. Which thyroid malignancy is common after radiation exposure? (MHSSMCET 2005)
 - a. Follicular
 - b. Papillary
 - c. Medullary
 - d. Anaplastic
14. A 10-years old boy presented with cervical lymphadenopathy. Needle biopsy from the nodes revealed secondaries from papillary carcinoma of thyroid. The child under went complete removal of tumor near total thyroidectomy and radical neck dissection. What should be the immediate next line of management? (All India 2012)
 - a. Start thyroxine suppression therapy
 - b. I-131 whole body scan to assess the extent of disease
 - c. Bone scan to evaluate secondaries
 - d. CECT scan to assess any residual disease

15. **Orphan Annie-eye nuclei seen in:** (Orissa 2011)
 a. Papillary carcinoma of thyroid
 b. Medullary carcinoma of thyroid
 c. Anaplastic carcinoma of thyroid
 d. Follicular carcinoma of thyroid
16. **Psammoma bodies are seen in following except:** (PGI 2002)
 a. Serous cystadenoma of ovary
 b. Mucinous cystadenoma of ovary
 c. Meningioma
 d. Papillary carcinoma of thyroid
17. **Which of the following would be the best treatment for a 2 cm thyroid nodule in a 50-years old man with FNAC revealing it to be a papillary carcinoma?** (All India 2009)
 a. Hemithyroidectomy (Recent Question 2015)
 b. Subtotal thyroidectomy with modified neck dissection
 c. Near total thyroidectomy with modified neck dissection
 d. Hemithyroidectomy with modified neck dissection
18. **True regarding papillary carcinoma of thyroid:**
 a. Undifferentiated carcinoma (MCI March 2006)
 b. Blood-borne metastasis is commoner
 c. Excellent prognosis
 d. Capsulated
19. **True about papillary carcinoma thyroid is:** (PGI Dec 99)
 a. Comprises 10-15% of all thyroid cancers
 b. Cells have intranuclear vacuolation
 c. Amyloid deposition seen
 d. Encapsulated
20. **Papillary carcinoma thyroid usually presents as:** (PGI Dec 96)
 a. Diffuse nodular swelling
 b. Only lymphadenopathy
 c. Hormonal disturbance
 d. Single nodule + local lymph node
21. **Which type of thyroid carcinoma has the best prognosis?** (DNB 2010, All India 96)
 a. Papillary carcinoma
 b. Anaplastic carcinoma
 c. Follicular carcinoma
 d. Medullary carcinoma
22. **One of the following is not correct in papillary carcinoma of thyroid:**
 a. Can be reliably diagnosed using fine needle aspiration cytology
 b. Always unifocal
 c. Typically spreads to the cervical lymph nodes
 d. Requires a total thyroidectomy for large tumors
23. **Compared to follicular carcinoma, papillary carcinoma of thyroid have:** (PGI Dec 2007, June 2005, Dec 2006)
 a. More male preponderance
 b. Bilaterality
 c. Local recurrence common
 d. Increased lymph node metastasis
 e. Increased mortality
24. **Occult thyroid malignancy with nodal metastasis is:**
 a. Medullary carcinoma (DNB 2005, 2001, AIIMS Sept 96)
 b. Follicular carcinoma
 c. Papillary carcinoma
 d. Anaplastic carcinoma
25. **Least malignant thyroid cancer is:** (AIIMS Nov 2003)
 a. Papillary carcinoma
 b. Follicular carcinoma
 c. Anaplastic carcinoma
 d. Medullary carcinoma
26. **Lateral aberrant thyroid refers to:** (AIIMS June 2002)
 a. Congenital thyroid abnormality
 b. Metastatic foci from primary in thyroid
 c. Struma ovarii
 d. Lingual thyroid
27. **Treatment of papillary carcinoma of thyroid with bony metastasis:** (PGI June 2004)
 a. Radiotherapy
 b. Radioiodine
 c. Near total thyroidectomy with radiotherapy
 d. Near total thyroidectomy with radioiodine and radiotherapy
28. **Cervical lymph node involvement in papillary carcinoma thyroid, best treatment is:** (PGI June 97)
 a. Radioactive iodine b. Chemotherapy
 c. Radical neck dissection d. Steroid
29. **Which of the following is used in the treatment of differentiated thyroid cancer?** (All India 2006)
 a. I-131 b. ^{99m}Tc
 c. P-32 d. I-131 MIBG
30. **In treatment of papillary carcinomas thyroid, radioiodine destroys the neoplastic cells predominantly by:** (AIIMS Nov 2005)
 a. X-rays b. Beta rays
 c. Gamma rays d. Alpha particles
31. **A 21-years old woman has 3 cm node in the lower deep cervical chain on the left. The biopsy is interpreted as revealing normal thyroid tissue in a lymph node. The most likely diagnosis is:** (DNB 2012, DPG 2009 Feb)
 a. Subacute thyroiditis
 b. Metastatic carcinoma thyroid
 c. Hashimoto's disease
 d. Lateral aberrant thyroid
32. **All of the following regarding papillary carcinoma thyroid is true except:** (All India 90)
 a. Multicentric origin
 b. Secondaries to lymph nodes
 c. Slowing growing
 d. Bony metastasis in early stage
33. **Most common type of carcinoma thyroid having least chances of hematogenous spread:** (Recent Question 2015)
 a. Follicular b. Papillary
 c. Anaplastic d. Medullary

FOLLICULAR CARCINOMA

34. **All of the following are true for follicular carcinoma of thyroid except:** (COMEDK 2006)
 a. Lymph node involvement rare
 b. Vascular involvement common
 c. Younger patients have good prognosis
 d. Diagnosis by FNAC
35. **Thyroid carcinoma with pulsating vascular skeletal metastasis is:** (COMEDK 2007, All India 95)
 a. Follicular
 b. Anaplastic
 c. Medullary
 d. Papillary
36. **Follicular carcinoma of thyroid is due to mutation of:**
 a. RAS b. HGF (JIPMER 2010)
 c. RET d. ABL

37. A well differentiated follicular carcinoma of thyroid can be best differentiated from a follicular adenoma by:

- Hurthle cell change (All India 2011, 2009)
- Lining of tall columnar and cuboidal cells
- Vascular invasion
- Nuclear features

38. FNAC is useful in all the following types of thyroid carcinoma except: (IUPG 2010, MCI March 2005, All India 95)

- Papillary
- Follicular
- Anaplastic
- Medullary

39. Most probable malignancy that develops in a case of long-standing goiter is:

(Recent Questions 2015, Kerala PG 2015, AIIMS Feb 97, Nov 2001)

- Follicular carcinoma
- Anaplastic carcinoma
- Papillary carcinoma
- Medullary carcinoma

40. Bone metastasis is common in which thyroid tumor:

- Follicular
- Papillary (AIIMS Nov 99)
- Hurthle cell tumour
- Anaplastic

41. Thyroid nodule of 4 cm size, mobile but causing compressive symptoms. All are true except: (DNB 2011)

- FNAC is investigation of choice
- FNAC cannot distinguish follicular adenoma from carcinoma
- Managed by sub-total thyroidectomy
- Cold nodules are diagnostic of malignancy

42. In case of adenomatoid goiter which carcinoma is commonest to occur: (AIIMS Nov 98)

- Medullary carcinoma
- Follicular carcinoma
- Papillary carcinoma
- Anaplastic carcinoma

43. Carcinoma thyroid with blood borne metastasis is:

- Follicular
- Papillary (AIIMS Feb 97)
- Medullary
- Anaplastic

44. Lymph node metastasis is least commonly seen with:

- Papillary CA Thyroid (All India 94)
- Medullary CA Thyroid
- Follicular CA Thyroid
- Anaplastic CA Thyroid

45. A 20-years old female patient presented with a thyroid swelling. Most probably, the fine needle aspiration cytology will not diagnose: (AIIMS Nov 97)

- Papillary carcinoma of thyroid
- Medullary carcinoma of thyroid
- Non-Hodgkin's lymphoma of thyroid
- Follicular carcinoma of thyroid

46. Hurthle cells tumour is: (WBPG 2012, DPG 2007)

- Papillary carcinoma thyroid
- Follicular carcinoma thyroid
- Medullary carcinoma thyroid
- Anaplastic carcinoma

47. Metastasis from follicular carcinoma should be treated by: (MCI Sept 2006)

- Radioiodine
- Surgery
- Thyroxine
- Observation

48. True regarding follicular carcinoma of thyroid:

- Hematogenous spread (JIPMER 2014, 2013)
- Commonly multifocal
- Readily diagnosed by face
- Most commonly carcinoma of thyroid

49. The microscopic feature that differentiates a follicular carcinoma from a follicular adenoma: (COMEDK 2014)

- Nuclear pleomorphism
- Hurthle cell change
- Capsular invasion
- Absence of colloid

50. FNAC cannot detect which of the following?

(AIIMS November 2014)

- Follicular carcinoma
- Papillary carcinoma
- Colloid goiter
- Hashimoto's thyroiditis

MEDULLARY CARCINOMA

51. Screening method of medullary carcinoma thyroid is:

(All India 97, AIIMS Nov 95)

- Serum calcitonin
- Serum calcium
- Serum alkaline phosphate
- Serum acid phosphatase

52. Treatment of medullary carcinoma thyroid:

(AIIMS May 2011)

- Surgery and Radiotherapy
- Radiotherapy and Chemotherapy
- Surgery only
- Radioiodine ablation

53. False statement about feature of MTC:

(PGI Nov 2011)

- Familial MTC may presents in 2nd decade
- It has characteristic amyloid stroma
- Secrete serotonin
- Take up radioiodine
- Secrete calcitonin

54. Thyroid radioiodine ablation therapy is useful in all except:

(PGI May 2011)

- Recurrent papillary carcinoma
- Residual papillary carcinoma
- Anaplastic carcinoma
- Follicular carcinoma
- Medullary carcinoma

55. Feature(s) of medullary carcinoma thyroid:

(PGI Nov 2010)

- Arises from parafollicular cells
- Amyloid stroma is present on histology
- 10-26% cases are familial
- Diarrhea occurs
- Total thyroidectomy is performed

56. Age for prophylactic thyroidectomy in MEN IIB syndrome?

(MHSSMCET 2009)

- 1 month
- 2 months
- 4 months
- 6 months

57. Recommended age for prophylactic thyroidectomy for MEN-2 is:

(Recent Question 2015)

- 5 years
- Before 1 year
- At the time of diagnosis
- Any time

58. Thyroid carcinoma associated with hypocalcemia is:

(AIIMS Dec 94)

- Follicular carcinoma
- Medullary carcinoma
- Anaplastic carcinoma
- Papillary carcinoma

59. Medullary carcinoma thyroid arises from: (AIIMS Nov 93)

- Parafollicular cells
- Cells lining the acini
- Capsule of thyroid
- Stroma of the gland

60. Which of the following is true regarding medullary carcinoma of the thyroid? (PGI Dec 2001)

- Arises from parafollicular cells
- Secretes calcitonin
- Occurs in families
- Amyloid in stroma
- Commonly malignant

61. Amyloid deposition is seen in which type of carcinoma thyroid: (MCI Sept 2009)
 a. Follicular b. Papillary
 c. Anaplastic d. Medullary
62. All of the following are true regarding medullary carcinoma of thyroid except: (MCI March 2010)
 a. Total thyroidectomy is done
 b. Parafollicular cells involved
 c. TSH dependent
 d. Releases calcitonin
63. Treatment of medullary carcinoma thyroid: (AIIMS Nov 2008)
 a. Surgery and radiotherapy
 b. Radiotherapy and chemotherapy
 c. Surgery only
 d. Radioiodine ablation
64. Needle biopsy of solitary thyroid nodule in a young woman with palpable cervical lymph nodes on the same sides demonstrates amyloid in stroma of lesion. Likely diagnosis is: (All India 2002)
 a. Medullary carcinoma thyroid
 b. Follicular carcinoma thyroid
 c. Thyroid adenoma
 d. Multinodular goiter
65. In medullary carcinoma thyroid tumour marker is: (WBPG 2014, AIIMS June 98)
 a. TSH b. Calcitonin
 c. T3, T4 and TSH d. Alpha Fetoprotein
66. After thyroidectomy for medullary carcinoma of thyroid, which is important for determining recurrence of tumour?
 a. Thyroglobulin b. TSH (MCI Sept 2009)
 c. CEA d. Thyroxine levels
67. The expression of the following oncogene is associated with a high incidence of medullary carcinoma of thyroid: (AIIMS Nov 2005)
 a. p53
 b. Her-2-neu
 c. Ret proto-oncogene
 d. Rb gene
68. A 26-years women presents with a palpable thyroid nodule, and needle biopsy demonstrates amyloid in the stroma of the lesion. A cervical lymph node is palpable on the same side as the lesion. The preferred treatment should be:
 a. Removal of the involved node, the isthmus, a portion of the opposite lobe and the enlarged lymph node
 b. Removal of the involved lobe, the isthmus, a portion of the opposite lobe, and the enlarged lymph node
 c. Total thyroidectomy and modified neck dissection on the side of the enlarged lymph node
 d. Total thyroidectomy and irradiation of the cervical lymph nodes (BIHAR PG 2014, All India 2002)
69. Amyloid stroma is seen in which carcinoma thyroid: (AIIMS June 2000)
 a. Papillary carcinoma
 b. Medullary carcinoma
 c. Anaplastic carcinoma
 d. Follicular carcinoma
70. A patient has pituitary tumour and pheochromocytoma and a thyroid nodule. Which carcinoma is most likely to occur? (AIIMS Nov 2000)
 a. Follicular carcinoma b. Medullary carcinoma
 c. Papillary carcinoma d. Anaplastic carcinoma
71. A 52-years female patient presents with symptoms of pheochromocytoma. She also has a thyroid carcinoma. Her thyroid carcinoma is of which type: (AIIMS June 99)
 a. Anaplastic b. Medullary
 c. Follicular d. Papillary
72. MEN-2 is seen with the following type of thyroid carcinoma: (All India 97)
 a. Papillary b. Medullary
 c. Anaplastic d. Follicular
73. Serum calcitonin is a marker for: (DNB 2003, All India 94)
 a. Anaplastic carcinoma b. Papillary carcinoma
 c. Medullary carcinoma d. Follicular carcinoma
74. Treatment of choice for medullary carcinoma of thyroid is: (AIIMS May 2005)
 a. Total thyroidectomy
 b. Partial thyroidectomy
 c. I-131 ablation
 d. Hemithyroidectomy
75. Treatment of medullary carcinoma of thyroid with lymph node metastasis: (PGI June 2005)
 a. Subtotal thyroidectomy + Radioiodine
 b. Subtotal thyroidectomy + Radiotherapy
 c. Near total thyroidectomy + Radioiodine
 d. Near total thyroidectomy + Radiotherapy
 e. Total thyroidectomy + Radiotherapy
76. All of the following are helpful for diagnosis of medullary carcinoma thyroid except: (PGI 2000)
 a. Spindle cell stroma with few follicles
 b. Amyloid deposition
 c. Calcitonin in stroma
 d. Histological mitochondria is essential for diagnosis
77. Which of the following gene defects is associated with development of medullary carcinoma of thyroid?
 a. Ret proto-oncogene b. FAP gene (All India 2004)
 c. Rb gene d. BRCA-1 gene
78. Commonest presenting complaints of medullary carcinoma thyroid: (PGI 84)
 a. Diarrhea b. Dysphagia
 c. Hoarseness d. Flushing
79. Which of the following is true about medullary carcinoma?
 a. Calcitonin is not a marker (DPG 2008)
 b. Arises from parafollicular C cells
 c. Produces PTH
 d. Take up radioiodine
80. True about medullary carcinoma thyroid: (DPG 2007)
 a. Good prognosis
 b. Associated with MEN-1
 c. Increased calcitonin is not associated with hypocalcemia
 d. Treated by near total thyroidectomy
81. All are true regarding medullary carcinoma of thyroid except: (JIPMER 2014, 2013)
 a. It arises from 'C' cells
 b. Secrete high levels of calcitonin
 c. It is dependent on TSH
 d. Most cases are familial
82. Regarding anaplastic carcinoma which statements(s) is/are true: (PGI Dec 2008)
 a. Common in elderly
 b. Well encapsulated
 c. Surrounding neck tissue is usually free
 d. Distant metastasis is common
 e. Some degree of differentiation to papillary and follicular type is seen

ANAPLASTIC CARCINOMA

83. Not true about anaplastic thyroid carcinoma:

- Local infiltration common (PGI May 2011)
- Spread by lymphatic route
- Long term survival in patient undergoing surgery
- Surgery is of limited value
- Highly chemosensitive

84. A patient with long standing multinodular goitre develops hoarseness of voice and swelling undergoes sudden increase in size. Likely diagnosis is:

(Recent Question 2014, All India 2001)

- Follicular carcinoma
- Papillary carcinoma
- Medullary carcinoma
- Anaplastic carcinoma

85. The treatment of choice for anaplastic carcinoma of thyroid infiltrating trachea and sternum will be: (AIIMS Nov 2005)

- Radical excision
- Chemotherapy
- Radiotherapy
- Palliative/Symptomatic treatment

86. Regarding anaplastic carcinoma which statements (s) is/are true:

- Common in elderly (PGI Dec 2008, June 2004)
- Associated with p53 mutation
- Surrounding neck tissue is usually free
- Radiotherapy cures
- Lymphatic spread occur

87. Least common thyroid malignancy is: (Recent Question 2015)

- Papillary
- Follicular
- Medullary
- Anaplastic

THYROID METASTASIS**88. Metastasis in thyroid gland come most commonly from carcinoma of:** (PGI June 98)

- Testis
- Prostate
- Breast
- Lungs

THYROID LYMPHOMA**89. All of the following are true about lymphoma of the thyroid except:** (All India 2007)

- More common in females
- Slow growing
- Clinically confused with undifferentiated tumors
- May present with respiratory distress and dysphagia

CARCINOMA THYROID**90. False statement regarding thyroid carcinoma:** (PGI Nov 2011)

- Medullary thyroid carcinoma is associated with MEN-2A
- Follicular carcinoma -Most common type of carcinoma
- Papillary carcinoma -Multifocal
- Thyroid lymphoma is often associated with Hashimoto thyroiditis
- Anaplastic carcinoma occur in old age women

91. True about thyroid carcinoma: (PGI Dec 2006)

- Follicular carcinoma have worse prognosis than papillary carcinoma
- Papillary carcinoma spreads by hematogenous route more frequently than follicular carcinoma
- Papillary carcinoma have increased mortality than follicular carcinoma

- Follicular carcinoma are more bilateral than papillary carcinoma
- Follicular carcinoma have more male incidence than papillary carcinoma

92. Low risk in carcinoma thyroid: (PGI Dec 2006)

- Men <50 years
- Women <40 years
- Papillary carcinoma <4cm
- Metastasis
- Follicular carcinoma >5cm

93. The most common histologic type of thyroid cancer is:

(Recent Question 2015, All India 2008, 2004, AIIMS Nov 05, PGI Dec 2005)

- Medullary type
- Follicular type
- Papillary type
- Anaplastic type

94. Which of the following is not a histological variant of thyroid neoplasm? (All India 2007)

- Follicular
- Merkel cell
- Insular
- Anaplastic

95. Thyroid carcinoma: (PGI 82, UPSC 87)

- Is often associated with hypothyroidism
- Often produces hyperthyroidism
- Is usually euthyroid
- Occurs in toxic nodules

96. Amount of I-131 given for carcinoma thyroid: (DPG 2006)

- 5 micro curie
- 50 micro curie
- 5 milli curie
- 50 milli curie

97. Thyroxine can be given in which thyroid carcinoma:

(MCI Sept 2009)

- Papillary
- Medullary
- Anaplastic
- Undifferentiated

98. Thyroid carcinoma causes laryngeal paralysis due to:

(PGI June 96)

- Recurrent laryngeal nerve palsy
- Vagus nerve palsy
- Glossopharyngeal nerve palsy
- Hypoglossal nerve palsy

99. Which of the following is used in the treatment of thyroid malignancy? (PGI June 2001)

- I-131
- I-125
- Tc-99
- P-32
- Strontium

100. Which of the following is used in the treatment of well differentiated thyroid carcinoma: (Recent Questions 2013)

- I¹³¹
- 99m Tc
- 32P
- MIBG

SOLITARY THYROID NODULE**101. Most sensitive investigation of thyroid nodule:**

- MRI
- PET Scan (Punjab 2011)
- USG
- Clinical examination

102. True about solitary thyroid nodule: (PGI Dec 2006)

- THR-Antibody
- Lined by columnar epithelium
- Diffuse hyperplasia of thyroid
- Common in female
- Thyroidectomy done

103. A case of solitary thyroid nodule, investigation of choice is:

(PGI June 97, 96, AIIMS Nov 97)

- T3, T4 estimation
- Thyroid scan
- FNAC
- Excision biopsy

104. Initial preferred investigation for thyroid nodule is:

- FNAC
- Radionuclide test
- Thyroid function test
- USG (DPG 2008)

105. Investigation of choice in discrete thyroid swelling is:*(Recent Question 2014)*

- a. Isotope scans
- b. Ultrasonography
- c. Autoantibody titres
- d. FNAC

106. A patient came with a small solitary nodule in right lobe of thyroid. FNAC shows follicular adenoma. The best surgery is:*(DNB 2002)*

- a. Enucleation
- b. Sub-total thyroidectomy
- c. Right hemithyroidectomy
- d. Near-total thyroidectomy

107. A 53 years old female with multinodular goiter underwent radioisotope scan, whose report shows warm nodules. Her chances of warm nodules being malignant is:*(MHCET 2016)*

- a. 5%
- b. 10%
- c. 15%
- d. 20%

108. A 45-years old male presents with 4X4 cm, mobile right solitary thyroid nodule of 5 months. The patient is euthyroid. The following statements about his management are true except:*(AIIMS Nov 2005)*

- a. Cold nodule on thyroid scan is diagnostic of malignancy
- b. FNAC is the investigation of choice
- c. The patient should undergo hemithyroidectomy if FNAC report is inconclusive
- d. Indirect laryngoscopy be done in the preoperative period to assess mobility of vocal cords

109. Most common solitary thyroid nodule is:*(AIIMS Nov 2004, June 93)*

- a. Follicular adenoma
- b. Hurthle cell carcinoma
- c. Papillary carcinoma
- d. Solitary idiopathic goiter

110. What is the most appropriate operation for a solitary nodule in one lobe of thyroid?*(All India 2003, AIIMS Nov 95)*

- a. Lobectomy
- b. Hemithyroidectomy
- c. Nodule removal
- d. Partial lobectomy with 1 cm margin around nodule

111. Percentage of cold nodules that becomes malignant are?*(DNB 2014)*

- a. 5%
- b. 15%
- c. 20%
- d. 40%

112. Which is the investigation of choice to differentiate between benign and malignant thyroid nodule?*(DNB 2014)*

- a. USG
- b. FNAC
- c. Scintigraphy
- d. Biopsy

GOITRE**113. Multi-nodular goiter (MNG) secondary thyrotoxicosis is seen how much percentage of patient with MNG:***(MHSSMCET 2005)*

- a. 10%
- b. 20%
- c. 30%
- d. 40%

114. The most common presentation of endemic goiter is:*(All India 96)*

- a. Hypothyroid
- b. Diffuse goiter
- c. Hyperthyroid
- d. Solitary nodule

115. Thoracic extension of cervical goitre is usually approached through:*(AIIMS May 2005)*

- a. Neck
- b. Chest
- c. Combined cervico-thoracic
- d. Thoracoscopic

116. A 20 years old girl presents with 9 months history of neck swelling with thyrotoxic symptoms. On investigation increased T4 and decreased TSH with palpable 2 cm nodule was found. Next investigation will be:*(AIIMS May 2007)*

- a. USG
- b. Thyroid scan
- c. Radioactive iodine uptake
- d. CT scan

117. Indication of surgery in a case of thyroid swelling is/are:

- a. Cosmetic
- b. Pressure symptoms
- c. Myxedema
- d. Pain
- e. Swelling with symptoms

118. In a patient presenting with a swelling of the thyroid, the radionuclide scan showed a cold nodule and the ultrasound showed a non cystic solid mass. The management of this patient would be:*(AIIMS June 2002)*

- a. Lobectomy
- b. Hemithyroidectomy
- c. Eltroxin
- d. Radio Iodine therapy

119. Symptoms of endemic goitre are all except:*(JIPMER 86)*

- a. Cold intolerance
- b. Hoarseness
- c. Dysphagia
- d. Heat intolerance

120. What percentage of cold thyroid nodules are malignant?*(JIPMER 87)*

- a. 70-80%
- b. 50-60%
- c. 40-50%
- d. 10-20%

121. Treatment of choice in cold nodule of thyroid:*(JIPMER 93)*

- a. Subtotal thyroidectomy
- b. Wait and watch
- c. I-131
- d. Hemithyroidectomy

122. Which of the following is true?*(AIIMS May 2011)*

- a. Colloid goiter mostly presents as hyperthyroidism
- b. Thyroid storm, the clinical features are primarily due to increased thyroxine
- c. Excess calcium intake can lead to hyperthyroidism
- d. Goitre more than 5 percent of population is endemic goitre

123. A 12-year old girl presents with nodular goiter. Which of the following statements regarding her evaluation and management is incorrect?*(AIIMS May 2014)*

- a. 99 m-Tc scan should be performed to determine whether the nodules are hypofunctioning or hyperfunctioning
- b. Functional thyroid nodules are usually benign
- c. All nodules > 4 cm should be resected irrespective of cytology
- d. FNAC should be performed for all nodules > 1 cm in diameter

RETROSTERNAL GOITRE**124. Most common symptom of retrosternal goiter:**

- a. Dysphagia
- b. Stridor
- c. Dyspnea
- d. Superior vena cava syndrome

125. Retrosternal tumor cause:*(TN 89)*

- a. Bluish discoloration of the face
- b. Edema of face
- c. Can occur in thyroid tumors
- d. All

126. Retrosternal goiter is characterized by:*(DPG 2005)*

- a. Stridor
- b. Always malignant
- c. Bilateral
- d. None of the above

THYROTOXICOSIS**127. Thyroid storm after operation is due to:***(COMEDK 2007)*

- a. Inadequate control of hyperthyroidism
- b. Massive bleeding

- c. Recurrent laryngeal nerve injury
d. Postoperative infection
128. Which of the following is the agent of choice for treating thyrotoxicosis during pregnancy? (COMEDK 2010)
a. Carbimazole b. Propylthiouracil
c. Methimazole d. Radioactive I-131
129. All of the following are features of thyrotoxicosis, except:
a. Diastolic murmur
b. Soft non ejection systolic murmur
c. Irregularly, irregular pulse
d. Scratching sound in systole
130. Dancing carotid is seen in: (AIIMS Dec 98)
a. Thyrotoxicosis b. Hypothyroidism
c. AV Fistula d. Blow out carotid
131. The best marker to diagnose thyroid related disorder is:
a. T3 b. T4
c. TSH d. Thyroglobulin
132. The laboratory investigation of patient shows ↓ in T3, ↓ in T4 and ↓ in TSH, it cannot be:
a. Primary hypothyroidism b. Pan-hypopituitarism
c. Liver disease d. None of the above
133. The occurrence of hypothyroidism following administration of supplemental iodine to subjects with endemic iodine deficiency goiter is known as:
a. Jod- Basedow effect (All India 2004)
b. Wolff-Chaikoff effect
c. Thyrotoxicosis factitia
d. De Quervain's thyroiditis
134. In thyrotoxicosis, β-blockers do not control: (All India 94)
a. Anxiety b. Tremors
c. Tachycardia d. Oxygen consumption
135. All of the following are associated with thyroid storm, except: (All India 2002)
a. Surgery for thyroiditis
b. Surgery for thyrotoxicosis
c. Stressful illness in thyrotoxicosis
d. I-131 therapy for thyrotoxicosis
136. Cardiovascular findings in an elderly thyrotoxicosis patient are all, except: (All India 2000)
a. Early diastolic murmur
b. Systolic ejection murmur
c. Scratch in left 2nd intercostal space
d. Irregularly irregular pulse
137. Treatment of thyroid storm includes all, except: (AIIMS Nov 2003)
a. Propranolol b. Radioactive iodine
c. Hydrocortisone d. Lugol's iodine
138. Difference between thyrotoxicosis and malignant hyperthermia is: (AIIMS June 2001)
a. Hyperthermia b. Tachycardia
c. Muscle rigidity d. Elevated serum CPK level
139. In thyrotoxicosis, which of the following is seen? (TN 89)
a. Pretibial myxedema b. Glycosuria
c. Unilateral exophthalmos d. All
140. Toxic adenoma on scanning appear as: (JIPMER 98)
a. Hot nodule b. Cold nodule
c. Warm nodule d. Neutral
141. Thyroid storm after operation is due to: (COMEDK 2007)
a. Inadequate control of hyperthyroidism
b. Massive bleeding
c. Recurrent laryngeal nerve injury
d. Postoperative injection
142. A 48-years old woman underwent subtotal thyroidectomy. She has vague family history of malignant hyperthermia. She develops agitation, restlessness, fever, tremor, shivering, and tachypnea. Thyrotoxic crises can be best distinguished from malignant hyperthermia by estimating: (Kerala 2004)
a. Temperature variation b. Increased CPK levels
c. LDH d. Muscular rigidity
143. A 55-years old male patient underwent cholecystectomy for Gall stone calculus. During surgery the patient's pulse was irregularly irregular, 160/min, BP = 80/50 mm of Hg, temp. 40°C. On examination a swelling in the neck was found. Most likely diagnosis is: (MAHE 2007)
a. Thyroid storm b. Myocardial infarction
c. Arrhythmias d. Stridor
144. All of the following conditions are associated with hyperthyroidism, except: (All India 2011)
a. Hashimoto's thyroiditis b. Grave's disease
c. Toxic multinodular goiter d. Struma ovary
145. Hyperthyroidism occurs in: (PGI Nov 2011)
a. Hashimoto thyroiditis
b. Graves' disease
c. Medullary thyroid carcinoma
d. Plummer's disease
e. Struma ovarii
146. Features of hyperthyroidism are all except: (MCI March 2005)
a. Voracious appetite b. Cold intolerance
c. Emotional disturbance d. Sleeplessness
147. Which of the following is not a symptom of hypothyroidism: (JIPMER 2014, 2007)
a. Hyperactivity b. Palpitation
c. Diarrhoea d. Hair loss
148. Reduction of size and vascularity prior to thyroidectomy is done by: (Recent Question 2015)
a. Iodides b. Propylthiouracil
c. Radioiodine d. Propranolol
149. A patient underwent thyroidectomy for Hyperthyroidism. Two days later he presented with features of thyroid storm. What is the most likely cause? (AIIMS November 2015)
a. Poor antibiotic coverage
b. Rough handling during surgery
c. Removal of parathyroid
d. Inadequate preoperative preparation

GRAVE'S DISEASE

150. All of the following are features of Grave's disease except: (MCI Sept 2005)
a. More common in males
b. Tremor
c. Pretibial myxoedema
d. Intolerance to heat
151. All of the following are true regarding Grave's disease except: (MCI Sept 2006)
a. Orbital proptosis
b. Presents as primary thyrotoxicosis
c. Anti-TPO antibodies
d. Pretibial myxoedema
152. Complications of therapy with radioactive iodine includes: (UPSC 87, 88)
a. Thyroid malignancy
b. Hypothyroidism
c. Leukemia
d. All of the above

153. Which of the following conditions is most common complication of radioiodine treatment of Grave's disease? (COMEDK 2005, 2004)
- Thyroid storm
 - Subacute thyroiditis
 - Thyroid cancer
 - Hypothyroidism
154. In which of the following conditions radioactive iodine (Irradiation) can be used in Grave's disease: (PGI Nov 2010)
- Recurrence
 - Age >40 years
 - Elderly
 - Pregnant
 - Presence of associated co-morbidities
155. Pretibial myxedema is seen in: (MHPGMET 2005)
- Thyrotoxicosis
 - Hypothyroidism
 - Hyperparathyroidism
 - All
156. Therapy of choice for diffuse toxic goiter in a patient over 45 years: (JIPMER 87)
- Surgery
 - Antithyroid drugs
 - Radioiodine
 - Antithyroid drugs first followed by surgery
157. All of the following are true about Graves disease except: (JIPMER 2013)
- Cardiac failure is common
 - Hypertrophy and hyperplasia of thyroid gland is due to TSH-Rab
 - Remissions and exacerbations are not infrequent
 - It is highly vascular with audible bruit

HYPOTHYROIDISM

158. In case of hypothyroidism which investigation is most informative and most commonly used: (AIIMS June 98)
- Serum TSH level
 - Serum T3, T4 level
 - Serum calcitonin assay
 - Serum TRH assay
159. Hypothyroidism with increased TSH level is seen in all except: (PGI 90)
- Sheehan's syndrome
 - Lithium carbonate therapy
 - Post radioiodine ablation
 - Endemic goitre

POST THYROIDECTOMY COMPLICATIONS

160. During thyroidectomy, inferior thyroid artery is ligated at: (MCI Sept 2005)
- Maximally away from the gland
 - Close to the gland
 - Half way from the gland
 - None of the above
161. Complications of total thyroidectomy include all except: (AIIMS May 2005)
- Hoarseness
 - Airway obstruction
 - Hemorrhage
 - Hypercalcemia
162. Two hours after subtotal thyroidectomy for thyrotoxicosis, young woman rapidly becomes agitated and complains of increasing difficulty in breathing. Her pulse rate rises and central cyanosis is noticed on examination, her neck is found to be tensely swollen beneath the stitches. The most appropriate management in this case would be: (DPG 2011)
- Intranasal oxygen
 - Passing an endotracheal tube in the ward
 - Removing sutures from all layers in the ward and evacuation of hematoma
 - Immediate transfer of the patient to the operation theatre for tracheostomy
163. Horner's syndrome, all are true except: (AIIMS May 2011)
- Miosis
 - Anhydrosis
 - Hyperchromatic iris
 - Apparent exophthalmos
164. Horner's syndrome is seen in all except: (AIIMS Nov 2010)
- Carotid artery aneurysm
 - Medial medullary syndrome
 - Can occur following surgery for Raynaud's syndrome
 - Multiple sclerosis
165. Horner's syndrome does not include: (COMEDK 2004)
- Ptosis
 - Anhydrosis
 - Flushing
 - Mydriasis
166. During thyroidectomy, inferior thyroid artery ligation is done at what level? (MHPGMCET 2003)
- As close to the thyroid gland as possible
 - As far away as possible from the thyroid gland
 - In the trachea-esophageal groove
 - Any of the above
167. About thyroid surgery all are true except: (Punjab 2008)
- Superior thyroid artery is ligated near the gland
 - Capsule is removed
 - Inferior thyroid artery is ligated away from gland
 - Capsule is kept intact
168. Hypoparathyroidism following thyroid surgery occurs within: (AIIMS Nov 2004, Nov 2003)
- 24 hours
 - 2-5 days
 - 7-14 days
 - 2-3 weeks
169. Complications of hemithyroidectomy include all of the following except? (All India 2008)
- Hypocalcemia
 - Wound hematoma
 - Recurrent laryngeal nerve palsy
 - External branch of superior laryngeal nerve palsy
170. A patient undergoes thyroid surgery, following which he develops perioral tingling. Blood calcium is 8.9 meq/L. Next step is: (All India 2001)
- Vitamin D orally
 - Oral calcium and vitamin D
 - Intravenous calcium gluconate and serial monitoring
 - Wait for calcium to decrease to <7.0 before talking further action
171. Patient after thyroid surgery presents with perioral paresthesia. Serum calcium level is 7 mg/dl. What will be the best management: (AIIMS Nov 2000)
- Oral vitamin D3
 - Oral vitamin D3 with calcium
 - IV calcium gluconate
 - Oral calcium
172. A post-thyroidectomy patient develops signs and symptoms of tetany. The management is: (All India 2000)
- IV calcium gluconate
 - Bicarbonate
 - Calcitonin
 - Vitamin D
173. In postoperative room after thyroid surgery patient developed sudden respiratory distress, dressing was removed and it was found to be slightly blood stained and wound was bulging. What will be first thing to be done? (AIIMS June 2000, Nov 2000)
- Tracheostomy
 - Cricothyroidotomy
 - Laryngoscopy and intubation
 - Remove the stitch and take the patient to O.T.
174. A patient presents with swelling in the neck following a thyroidectomy; what is the most likely resulting complication? (All India 2001)
- Respiratory obstruction
 - Recurrent laryngeal nerve palsy
 - Hypovolemia
 - Hypocalcemia

175. Patient presents with neck swelling and respiratory distress few hours after a thyroidectomy surgery. Next management would be: (All India 2001)
- Open immediately
 - Trecheostomy
 - Wait and watch
 - Oxygen by mask
176. Most dangerous complication in a patient who had undergone thyroid surgery and develop hematoma at the operative site: (AIIMS Nov 99)
- Respiratory obstruction
 - Recurrent laryngeal nerve palsy
 - Dysphagia
 - Shock
177. After thyroidectomy, patient developed stridor within 2 hours. All are likely cause of stridor except: (AIIMS Nov 2001, Nov 2000)
- Hypocalcemia
 - Recurrent laryngeal nerve palsy
 - Laryngomalacia
 - Wound hematoma
178. A 50-years old male is suffering from severe dyspnea after thyroid surgery, treatment of choice is: (AIIMS June 97)
- Tracheostomy
 - Open the operative site
 - Wait and watch
 - Cricothyroidotomy
179. A patient operated for thyroid surgery for a thyroid swelling, later in the evening developed difficulty in breathing. There was swelling in the neck. The immediate management would be: (AIIMS June 2002)
- Epinephrine injection
 - Tracheostomy
 - IV calcium gluconate
 - Open the wound sutures in the ward
180. Replacement dose of thyroxine is: (All India 93)
- 0.1-0.2 mg
 - 0.3-0.4 mg
 - 1-2 mg
 - 3-4 mg
181. All of the following are early life threatening complications of thyroid operation except: (DPG 2010, SGPGI 2005)
- Tracheomalacia and collapse of the larynx
 - Wound hematoma with compression of the trachea
 - Hypocalcemia
 - Thyroid storm
182. Vocal cord palsy in thyroid surgery is due to injury to:
- Superficial laryngeal nerve (COMEDK 2008, UPSC 2008)
 - Recurrent laryngeal nerve
 - Ansa cervicalis
 - Vagus nerve
183. Hemorrhage after thyroidectomy is due to: (Recent Questions 2014)
- External carotid artery
 - Internal carotid artery
 - Superior thyroid artery
 - Inferior thyroid artery
186. A patient with autoimmune thyroiditis present with hypothyroidism. Which of the following is true? (JIPMER 2011)
- Thyroid peroxidase antibodies
 - Painless enlargement of thyroid
 - Common in men
 - No malignant risk
187. A person has fever and pain in thyroid gland. True statement(s) is/are: (PGI June 2009)
- T3 and T4 level normal
 - ↑ESR
 - ↑TSH
 - It is due to TB
 - Radioactive iodine uptake is ↑ed
188. Hashimoto's thyroiditis, all are true except: (AIIMS May 2011)
- Follicular destruction
 - Increase in lymphocytes
 - Oncocytic metaplasia
 - Orphan Annie eye nuclei
189. The laboratory investigation of a patient shows ↓T4, and ↑TSH. Which of the following is the most likely diagnosis: (All India 2011)
- Grave's disease
 - Hashimoto's disease
 - Pituitary failure
 - Hypothalamic failure
190. Which of the following conditions is associated with hypothyroidism? (All India 2011)
- Hashimoto's thyroiditis
 - Grave's disease
 - Toxic multinodular goiter
 - Struma ovary
191. Most common cause of thyroiditis is: (All India 2000)
- Reidel's thyroiditis
 - Subacute thyroiditis
 - Hashimoto's thyroiditis
 - Viral thyroiditis
192. All of the following are true of de-Quervain's thyroiditis except: (All India 1996)
- Pain
 - Increased ESR
 - Increased radioactive iodine uptake
 - Fever
193. Not a feature of de-Quervain's disease: (All India 2002)
- Autoimmune in etiology
 - ↑ESR
 - Tends to regress spontaneously
 - Painful and associated with enlargement of thyroid
194. Decreased radio iodine uptake is/are seen in: (PGI Dec 2000)
- Toxic multinodular goiter
 - Grave's disease
 - Subacute thyroiditis
 - Factitious thyroiditis
195. Which of the following is wrong about subacute thyroiditis?
- Usually presents with painful enlargement of thyroid gland (Orissa 2011)
 - There may be features of hyperthyroidism or hypothyroidism
 - In the thyrotoxic phase radioiodine uptake is increased
 - High ESR
196. 'Hurthle cells' are seen in: (All India 95)
- Agranulomatous thyroiditis
 - Hashimoto's thyroiditis
 - Papillary carcinoma of the thyroid
 - Thyroglossal cyst
197. A patient presents with bilateral proptosis, heat intolerance and palpitations. Most unlikely diagnosis here would be: (All India 2001)
- Hashimoto's thyroiditis
 - Thyroid adenoma
 - Diffuse thyroid goitre
 - Reidel's thyroiditis

THYROIDITIS

184. Thyroid biopsy of a patient showed the presence of Hurthle cells. Antibodies found in this condition are: (Punjab 2011)
- Anti-TPO
 - Anti-mitochondrial
 - Anti-RNP
 - Anti-dsDNA
185. A 40-years old female presents with fever, fatigue, diffuse painful swelling in the midline of the neck, FNAC of the same reveals epithelioid cells and giant cells, the likely diagnosis is:
- Acute thyroiditis
 - Subacute thyroiditis
 - Tubercular lymphadenitis
 - Hashimotos thyroiditis

198. A 25-years male presents with ophthalmologic signs of thyrotoxicosis. All are possibilities, except: (All India 2002)
 a. Diffused thyroid goitre b. Hashimoto's thyroiditis
 c. Riedel's thyroiditis d. Adenomatous goitre
199. A young patient has a midline, tender swelling in neck occurring after an attack of sore throat. The diagnosis is: (AIIMS Nov 93)
 a. Acute thyroiditis b. Thyroglossal cyst
 c. Subacute thyroiditis d. Toxic goiter
200. In Hashimoto's disease serum antibodies are mainly against: (JIPMER 79, AIIMS 84, 85)
 a. Thyroid follicles b. Thyroxine
 c. Thyroglobulins d. Iodine
201. The only reason for operating in case thyroiditis: (JIPMER 79, AIIMS 86)
 a. To prevent cancerous degeneration
 b. For relief of pain in neck and ear
 c. To overcome pressure on trachea or esophagus
 d. To cure the toxic reaction
 e. If there is auto immune reaction
202. All are true about Hashimoto's thyroiditis except: (Kerala 95)
 a. Antithyroid microsomal antibodies
 b. Antithyroid nuclear antibodies
 c. Anti-TSH receptor antibodies
 d. Increased level of thyroid hormones
203. The thyroiditis also known as "Painless Thyroiditis": (MAHE 2007)
 a. Subacute lymphocytic thyroiditis
 b. de-Quervain's thyroiditis
 c. Hashimoto's thyroiditis
 d. Riedel's thyroiditis
204. Anti-TPO antibodies are present in: (MCI Sept 2006)
 a. Reidel's thyroiditis
 b. Grave's disease
 c. Hashimotos thyroiditis
 d. de-Quervain's thyroiditis
205. A patient present with bilateral proptosis, heat intolerance and palpitations; most unlikely diagnosis here would be: (All India 2001, 2000)
 a. Hashimoto's thyroiditis b. Thyroid adenoma
 c. Diffuse thyroid goiter d. Reidel's thyroiditis
206. DeQuervain's thyroiditis is characterised by: (COMEDK 2014)
 a. Mononuclear cell infiltration
 b. Histiocyte reaction
 c. Giant cell infiltration
 d. Eosinophilia

THYROGLOSSAL CYST AND FISTULA

207. Hyoid bone is closely associated with: (Orissa 2011)
 a. Bronchogenic cyst b. Cystic hygroma
 c. Branchial cyst d. Thyroglossal cyst/fistula
208. True about thyroglossal cyst is all except: (MHPGMCET 2003)
 a. Does not move with deglutition
 b. Move with protrusion of tongue
 c. Sistrunk's operation is treatment of choice
 d. Most common site is subhyoid region
209. Sistrunk's operation is done in: (WBPG 2015, MHPGMCET 2008, 2006)
 a. Parotid tumor b. Thyroglossal fistula
 c. Thyroglossal cyst d. Branchial fistula
210. Most common site of thyroglossal cyst: (NEET 2013) (DNB 2009, 2007, 2005, 2003, MHSSMCET 2005, AIIMS June 97)
 a. Suprahyoid b. Hyoid
 c. Subhyoid d. Intra-thyroid
211. The following statements about thyroglossal cyst are true, except: (All India 2006)
 a. Frequent cause of anterior midline neck masses in the first decade of life
 b. The cyst is located within 2 cm of the midline
 c. Incision and drainage is the treatment of choice
 d. The swelling moves upwards on protrusion of tongue
212. Thyroglossal cyst may occasionally give rise to carcinoma:
 a. Papillary b. Medullary
 c. Anaplastic d. Follicular
213. Sistrunk's operation consists of: (DPG 2009 March)
 a. Excision of hyoid bone and cone of tongue muscle
 b. Excision of hyoid bone and the cyst
 c. Excision of central part of hyoid bone and cone of tongue muscles upto foramen caecum
 d. Excision of cyst only
214. A central midline neck swelling is noted in a 4 years old girl posted for tonsillectomy. The swelling is, painless, mobile, and cystic, just below the hyoid bone of size 2x1.1x1cm. USG showed a thick walled cystic lesion. Management would include: (AIIMS Nov 97)
 a. Surgical removal b. Antibiotics
 c. Percutaneous aspiration d. Chest X-ray

THYROID ANATOMY AND PHYSIOLOGY

215. The occurrence of hyperthyroidism following administration of supplemental iodine to subject with endemic iodine deficiency goitre is known as: (All India 2012)
 a. Jod-Basedow effect b. Wolff-Chaikoff effect
 c. Thyrotoxicosis factitia d. De-Quervains thyroiditis
216. Which of the following most closely represents the lowest detection limit for third generation TSH assays?
 a. 0.4 mIU/L b. 0.04 mIU/L (All India 2012)
 c. 0.004 mIU/L d. 0.0004 mIU/L
217. Recurrent laryngeal nerve is in close association with: (AIIMS Nov 93)
 a. Superior thyroid artery b. Inferior thyroid artery
 c. Middle thyroid vein d. Superior thyroid vein
218. Normal thyroid weight varies with dietary iodine content: (DPG 82)
 a. Directly proportional b. Inversely
 c. Inverse cubically d. Not fixed
219. Average weight of thyroid gland where diet is rich in iodine is: (UPSC 83)
 a. 10-12 gm b. 14-16 gm
 c. 18-20 gm d. 28-30 gm
220. Protein bound iodine measures secretory function of thyroid in all of the following circumstances except: (All India 90)
 a. Nephrotic syndrome
 b. Following hemithyroidectomy
 c. During ampicillin therapy
 d. Asthmatics on ephedrine
221. Isthmus of thyroid gland overlies the: (DPG 97)
 a. 1st tracheal cartilage
 b. 1st and 2nd tracheal cartilage
 c. 2nd and 3rd and 4th tracheal cartilage
 d. 3rd and 4th tracheal cartilage

MISCELLANEOUS

222. Scabard trachea is seen in: *(Karnataka 99)*
 a. Thyroid cancer b. Thyroiditis
 c. Goitre d. All of the above
223. A new born with a goiter large enough to cause dyspnoea is best treated with: *(AIIMS 81, 84)*
 a. Sulfonamides b. Tracheostomy
 c. T3 d. Iodides
224. Which of the following factors contribute to the development of duodenal ulcer? *(PGI 2001)*
 a. I-131 b. I-125
 c. Tc-99 d. P-32
225. In pregnancy: *(APPG 2004)*
 a. Radioiodine contraindicated
 b. Thiouracil is contraindicated
 c. Surgery is contraindicated
 d. None
226. Pendred's syndrome is due to a defect in: *(COMEDK 2007, 2008)*
 a. Chromosome 7p b. Chromosome 7q
 c. Chromosome 8p d. Chromosome 8q
227. Reddish swelling in the region of foramen caecum:
 a. Lingual thyroid b. Lingual tonsil *(DPG 2007)*
 c. Ranula d. Thyroglossal cyst
228. True about Struma Ovarii: *(PGI June 2007)*
 a. Ectopic thyroid b. Ectopic ovary
 c. Malignancy d. Benign lesion
 e. Included in teratoma
229. Absent parathyroid, thymic aplasia with immuno-deficiency and cardiac defects are features of: *(MHGMCET 2009)*
 a. Autoimmune polyglandular syndrome
 b. Pendred syndrome
 c. Di-George syndrome
 d. Lesch-Nyhan syndrome

PAPILLARY CARCINOMA

- ## Papillary Carcinoma of Thyroid

- Papillary carcinoma are rarely encapsulated^Q

6. Ans. c. Columnar d. Insular; e. Diffuse sclerosing (Ref: Schwartz 10/e p1542, 9/e p1361-1363; Sabiston 19/e p906-909; Bailey 26/e p765, 25/e p793-796)

Types of Papillary Carcinoma Associated with Poor Prognosis	
1. Tall cell ^a	5. Clear cell ^a
2. Insular ^a	6. Trabecular ^a
3. Columnar ^a	7. Poorly differentiated type
4. Diffuse sclerosing ^a	

7. Ans. a. Most common thyroid cancer; b. Psammoma bodies seen; c. Encapsulated
 8. Ans. b. Total thyroidectomy with left sided modified neck dissection
 9. Ans. a. Follicular carcinoma of thyroid (Ref: Schwartz 10/e p1542, 9/e p1362; Sabiston 19/e p906; Bailey 26/e p765, 25/e p793)

Psammoma Bodies (PSM)	
1. Papillary carcinoma thyroid ^a	2. Papillary carcinoma (RCC) ^a
3. Serous cystadenoma ^a	4. Meningioma ^a

10. Ans. a. FNAC easy; c. Psammoma body; d. Spread to cervical LN
 11. Ans. a. Radiation is a risk factor; b. Multifocal; d. Distant metastasis is seen
 12. Ans. d. Papillary carcinoma
 13. Ans. b. Papillary
 14. Ans. a. Start thyroxine suppression therapy (Ref: Schwartz 10/e p1549, 9/e p1365-1367; Sabiston 19/e p911; Bailey 26/e p766-768)

Well Differentiated Thyroid Cancer	
1. Papillary carcinoma of thyroid ^a	2. Follicular carcinoma of thyroid ^a
3. Follicular variant of papillary carcinoma thyroid ^a	4. Hurthle cell carcinoma (variant of follicular carcinoma thyroid) ^a

Postoperative Management of Well-Differentiated Thyroid Cancer

Radioiodine Therapy

- Postoperative RAI therapy **reduces recurrence** and provides a small **improvement in survival**, even in low-risk patients^a.
- **Metastatic differentiated thyroid carcinoma** can be **detected and treated** by ¹³¹I in about 75% of patients^a.
- RAI **effectively treats >70% of lung micrometastases^a** that are detected by RAI scan in the presence of a normal chest x-ray, whereas the success rates drop to <10% with pulmonary macrometastases. Early detection therefore appears to be very important to improve prognosis.

RAI Ablation Currently is Recommended for
<ul style="list-style-type: none"> • All patients with stage III or IV disease^a • All patients with stage II disease <45 years^a • Most patients 45 years or older with stage II disease^a • Patients with stage I disease who have aggressive histologies, nodal metastases, multifocal disease, and extrathyroid or vascular invasion^a

- **T₄ therapy** should be **discontinued for 6 weeks** before scanning with ¹³¹I. Patients should **receive T₃** during this time period to decrease the period if hypothyroidism. T₃ has a shorter half-life than T₄ (**1 day vs. 1 week**) and needs to be **discontinued for 2 weeks** to allow **TSH levels to rise** before treatment^a.
- A **low-iodine diet** also is recommended **during this 2-week period^a**.
- The usual protocol involves administering a **screening dose of 1 to 3 mCi of ¹²³I** and measuring uptake 24 hours later. **After a total thyroidectomy**, this value should be <1%. A **"hot" spot** in the neck after initial screening usually represents **residual normal tissue** in the thyroid bed.
- If there is **significant uptake**, then a **therapeutic dose of ¹³¹I, 30 to 100 mCi^a** should be administered to **low-risk patients** and **100 to 200 mCi in high-risk patients^a**.
- Approximately **one third** of these patients **demonstrate uptake** on posttreatment imaging, and **Tg levels usually decrease** in these patients, **documenting therapeutic benefit^a**.
- Patients with **previously positive scans** and patients with **serum Tg levels >2 ng/mL^a** usually need **another ¹³¹I treatment** after **6 to 12 months** until one or two negative scans are obtained.
- The **follow-up scan** can be done **after hormone withdrawal** or **after recombinant TSH**. The latter is **more expensive^a** but is preferred by patients.

External Beam Radiotherapy and Chemotherapy

- EBRT is occasionally required to **control unresectable, locally invasive or recurrent disease** and to **treat metastases in support bones^a** to decrease the risk of fractures.

- EBRT is of value for the **treatment and control of pain** from **bony metastases**^Q when there is **minimal** or **no RAIU**^Q.
- **Single and multidrug chemotherapy** has been used with **little success**^Q in disseminated thyroid cancer, and there is **no role for routine chemotherapy**
- **Doxorubicin** (Adriamycin) and **paclitaxel** (Taxol) are the **most frequently used agents**.

Thyroid Hormone

- **T₄** is necessary as **replacement therapy**^Q in patients after total or near-total thyroidectomy
- Has the **additional effect of suppressing TSH**^Q and **reducing the growth stimulus**^Q for any **possible residual thyroid cancer cells**^Q.
- **TSH suppression reduces tumor recurrence rates**^Q.
- **T₄** should be administered to ensure that the **patient remains euthyroid**^Q, with circulating TSH levels at about 0.1 U/L in low-risk patients, or <0.1 U/mL in high-risk patients.

Follow-Up of Patients with Differentiated Thyroid Cancer

Thyroglobulin Measurement

- **Tg levels** in patients who have undergone total thyroidectomy should be **<2 ng/mL**^Q when the patient is **taking T₄**, and **<5 ng/mL** when the patient is **hypothyroid**.

- A **Tg level >2 ng/mL** is **highly suggestive of metastatic disease** or **persistent normal thyroid tissue**^Q, especially if it increases when TSH levels increase when hypothyroid during preparation for RAI scanning or after recombinant TSH.

- Approximately **95%** of patients with **persistent or recurrent thyroid cancer** of **follicular cell origin** will have **Tg levels >2 ng/mL**^Q.
- **Tg and anti-Tg antibody** levels should be measured initially at **6-month intervals** and then **annually** if the patient is clinically disease free.
- More recently, **Tg measurements in FNAC aspirates** have been shown to be **useful in the detection of nodal metastatic disease**.

Imaging

- After the first posttreatment scan, low-risk patients with negative TSH-stimulated Tg and cervical ultrasound do not require routine diagnostic whole body radioiodine scans.
- **Diagnostic whole body scans 6 to 12 months after remnant ablation** may be of value in the follow-up of patients with **high or intermediate risk of persistent disease**^Q.

- **Cervical ultrasound** to evaluate the **thyroid bed** and **central and lateral cervical nodal compartments** should be performed at **6 and 12 months post-thyroidectomy** and then **annually**^Q for **at least 3 to 5 years**, depending on the patients' risk for recurrent disease and Tg status.
- If **RAI and ultrasound scans are negative** but **Tg levels remain elevated**, **FDG PET scans** can help to **localize the disease**^Q.

15. Ans. a. Papillary carcinoma of thyroid 16. Ans. b. Mucinous cystadenoma of ovary
17. Ans. c. Near total thyroidectomy with modified neck dissection
18. Ans. c. Excellent prognosis 19. Ans. d. Encapsulated
20. Ans. d. Single nodule + local lymph node 21. Ans. a. Papillary carcinoma
22. Ans. b. Always unifocal
23. Ans. b. Bilaterality; c. Local recurrence common; d. Increased lymph node metastasis (Ref: Schwartz 10/e p1542-1545, 9/e p795; Sabiston 19/e p906, 910; Bailey 25/e p794)

	Papillary	Follicular
Male incidence	+	++ ^Q
Lymph node metastasis	+++ ^Q	+
Blood vessel invasion	+	+++ ^Q
Recurrence rate	+	++ ^Q
Overall mortality	+	++ ^Q
Location of recurrent carcinoma		
Distant metastasis	+	++
Nodal metastasis	+++ ^Q	+
Local recurrence	++ ^Q	+
Bilaterality	+++ ^Q	+

24. Ans. c. Papillary carcinoma

25. Ans. a. Papillary carcinoma

26. Ans. b. Metastatic foci from primary in thyroid (Schwartz 10/e p1542, 9/e p1345; Sabiston 19/e p907)

Lateral Aberrant Thyroid

- Any thyroid tissue found laterally separate from the thyroid gland, is always considered to be a **metastasis in a cervical lymph node**^Q, as aberrant thyroid tissue never occurs in lateral position.
- Aberrant thyroid tissues are found along the course of the thyroglossal tract:
 - Lingual^Q
 - Cervical^Q
 - Thoracic^Q
- Papillary carcinoma of thyroid is MC associated^Q with lateral aberrant thyroid

27. Ans. d. Near total thyroidectomy with radioiodine and radiotherapy

28. Ans. c. Radical neck dissection

29. Ans. a. I-131

30. Ans. b. Beta rays (Schwartz 10/e p1546, 9/e p1355, 1365; Sabiston 19/e p898, 911; Bailey 26/e p767-768, 25/e p787, 791; William's Endocrinology 10/e p479)

Radioactive Iodine (I131) Therapy

- I¹³¹ is an effective agent for delivering high radiation doses to the thyroid tissue^Q
- It emits mainly beta radiation (90%), which penetrates only 0.5 mm^Q of the tissue and thus allow therapeutic effects on the thyroid without any damage to the surrounding structures, particularly the parathyroids.

Mechanism of Action

- I¹³¹ emits beta particles^Q and X-rays.
- Beta rays are utilized for their destructive effects on thyroid^Q cells.
- X-rays are useful for tracer studies.

Indications in Carcinoma Thyroid	Contraindications of I ¹³¹ Therapy
1. Distant metastasis ^Q at diagnosis	1. Childhood ^Q
2. Incomplete tumor resection ^Q	2. Pregnancy ^Q
3. Patients at high risk for mortality or recurrence ^Q	3. Lactation ^Q

31. Ans. d. Lateral aberrant thyroid

32. Ans. d. Bony metastasis in early stage

(Ref: Schwartz 9/e p1362, 1363, 1367, 1368; Sabiston 19/e p906, 909, 912, 913; Bailey 26/e p765-768, 25/e p795-797)

Carcinoma Thyroid	
Type	Mode of spread
Papillary carcinoma	Lymphatic ^Q spread
Follicular carcinoma	Hematogenous ^Q spread
Medullary carcinoma	Both lymphatic and hematogenous ^Q spread
Anaplastic carcinoma	Direct invasion ^Q

Carcinoma Thyroid	
Type	MC site of Metastasis
Papillary carcinoma	Lungs ^Q
Follicular carcinoma	Bones ^Q
Medullary carcinoma	Liver ^Q
Anaplastic carcinoma	Lungs ^Q

Pulsating Secondaries
1. Follicular carcinoma thyroid ^Q
2. RCC ^Q

Bone Metastasis in Carcinoma Thyroid	
Follicular carcinoma	Osteolytic metastasis (Pulsating secondaries in flat bones) ^Q
Medullary carcinoma	Osteoblastic metastasis ^Q

33. Ans. b. Papillary

FOLLICULAR CARCINOMA

34. Ans. d. Diagnosis by FNAC (Ref: Schwartz 10/e p1544, 9/e p1364, 1357; Sabiston 19/e p901-902; Bailey 26/e p765, 25/e p775)

Limitations of FNAC in Thyroid Diseases

1. Not able to distinguish follicular adenoma from follicular carcinoma^Q
2. Not able to distinguish Hurthle cell adenoma from Hurthle cell carcinoma^Q
3. Useless in Reidel's thyroiditis^Q (Biopsy is preferred)^Q
4. FNAC is less reliable in patients who have history of head and neck irradiation or family history of thyroid cancer due to higher likelihood of multifocal lesions and occult cancer^Q

35. Ans. a. Follicular

36. Ans. a. RAS (Ref: Schwartz 10/e p1541, 9/e p1361; Sabiston 19/e p905)

- Genes implicated in FCT: p53^Q, PTEN^Q, Ras^Q, PAX8/PPAR1

Oncogenes and Tumor-Suppressor Genes Implicated in Thyroid Tumorigenesis		
Gene	Function	Tumor
Oncogenes		
RET ^Q	Membrane receptor with tyrosine kinase activity	Sporadic and familial MTC, PTC (RET/PTC rearrangements)
MET ^Q	Same	Overexpressed in PTC
TRK1	Same	Activated in some PTC
TSH-R	Linked to heterotrimeric G protein	Hyperfunctioning adenoma
Gs (gsp)	Signal transduction molecule (GTP binding)	Hyperfunctioning adenoma, follicular adenoma
Ras ^Q	Signal transduction protein	Follicular adenoma and carcinoma, PTC
PAX8/PPAR1	Oncoprotein	Follicular adenoma, follicular carcinoma
B-Raf (BRAF) ^Q	Signal transduction	PTC, tall cell and poorly differentiated, anaplastic
Tumor suppressors		
p53 ^Q	Cell cycle regulator, arrests cells in G ₁ , induces apoptosis	De-differentiated PTC, FTC, anaplastic cancers
p16 ^Q	Cell cycle regulator, inhibits cyclin dependent kinase	Thyroid cancer cell lines
PTEN ^Q	Protein tyrosine phosphatase	Follicular adenoma and carcinoma

37. Ans. c. Vascular invasion (Ref: Schwartz 10/e p1544, 9/e p1363-1365; Sabiston 19/e p909-912; Bailey 26/e p765-768, 25/e p794-796; Harrison 18/e p2936)

Follicular carcinoma of Thyroid

- FTC account for 10% of thyroid cancers
- Occurs more commonly in iodine-deficient areas^Q.
- More common in women with mean age of 50 years
- Genes implicated in FCT: p53^Q, PTEN^Q, Ras^Q, PAX8/PPAR1

Pathology

- Usually solitary lesion surrounded by capsule^Q.
- Histologically, follicles are present, but the lumen may be devoid of colloid^Q.
- Malignancy is defined by the presence of capsular and vascular invasion^Q.
- Tumor infiltration and invasion, as well as tumor thrombus within the middle thyroid or jugular veins, may be apparent at operation.

Clinical Features

- Usually present as solitary thyroid nodules, occasionally with a history of rapid size increase, and long-standing goiter^Q.
- Pain is uncommon, unless hemorrhage into the nodule has occurred.
- Cervical lymphadenopathy is uncommon at initial presentation (about 5%)
- Preoperative clinical diagnosis of cancer is difficult unless distant metastases are present.
- Large follicular tumors (>4 cm) in older men are more likely to be malignant^Q.

MC site of metastasis is bone (Osteolytic metastasis with pulsating secondaries in flat bones)^Q

Diagnosis

- FNAC is unable to distinguish benign follicular lesions from follicular carcinomas^Q.

- **Intraoperative frozen-section** examination usually is **not helpful**, but should be **performed** when there is evidence of **capsular** or **vascular invasion**, or when **adjacent lymphadenopathy** is present.

Treatment

- **Follicular lesion: Hemithyroidectomy^Q** (80% of these patients will have **benign** adenomas)
- **Thyroid cancer: Total thyroidectomy^Q**
- **Total thyroidectomy** in **older patients** with follicular lesions **>4 cm** because of the **higher risk of cancer** in this setting (50%)^Q.
- **Prophylactic nodal dissection** is **unwarranted^Q** because nodal involvement is infrequent

Prognosis

- The **cumulative mortality**: 15% at 10 years and 30% at 20 years.
- **Most important** prognostic factor: **Age** and **distant metastasis**.

Poor long-term prognosis	
<ul style="list-style-type: none"> • Age >50 years^Q • Tumor size >4 cm^Q • Higher tumor grade^Q 	<ul style="list-style-type: none"> • Marked vascular invasion^Q • Extrathyroidal invasion^Q • Distant metastases^Q

38. Ans. b. Follicular
 40. Ans. a. Follicular
 42. Ans. b. Follicular carcinoma
 44. Ans. c. Follicular CA Thyroid
 46. Ans. b. Follicular carcinoma thyroid (Ref: Schwartz 10/e p1546, 9/e p1364; Sabiston 19/e p912)
39. Ans. a. Follicular carcinoma
 41. Ans. d. Cold nodules are diagnostic of malignancy
 43. Ans. a. Follicular; c. Medullary
 45. Ans. d. Follicular carcinoma of thyroid

Hürthle Cell Carcinoma

- Hürthle cell carcinomas account for approximately 3% of all thyroid malignancies
- Considered to be a subtype of follicular thyroid cancer^Q

Hürthle cell Tumors Differ from Follicular Carcinomas in
<ol style="list-style-type: none"> 1. More often multifocal and bilateral (about 30%)^Q 2. Usually do not take up RAI (about 5%)^Q 3. More likely to metastasize to local nodes (25%) and distant sites^Q 4. Associated with a higher mortality rate^Q (about 20% at 10 years)

Pathology

- Characterized by vascular or capsular invasion and can't be diagnosed by FNACQ.
- Tumors contain sheets of eosinophilic cells packed with mitochondria, which are derived from the oxyphilic cells of the thyroid gland.

Treatment

- Unilateral Hürthle cell adenomas: Hemithyroidectomy^Q
- Invasive Hürthle cell neoplasms: Total thyroidectomy + Routine central neck node removal^Q (MRND when lateral neck nodes are palpable)
- Retinoic acid, PPAR agonists have shown some utility in treating these tumors in vitro

47. Ans. a. Radioiodine
 50. Ans. a. Follicular carcinoma
48. Ans. a. Hematogenous spread
 49. Ans. c. Capsular invasion

MEDULLARY CARCINOMA

51. Ans. a. Serum calcitonin (Ref: Schwartz 10/e p1549-1550, 9/e p1367-1368; Sabiston 19/e p912-913; Bailey 26/e p768-769, 25/e p797; Harrison 18/e p2938)

Medullary Carcinoma Thyroid

- Neuroendocrine carcinoma arising from **parafollicular 'C' cells^Q** of thyroid
- **Parafollicular 'C' cells** are derived from the **ultimobranchial bodies^Q** and **secrete calcitonin^Q**
- **'C' Cells** are concentrated **superolaterally** in thyroid lobes, from where MTC usually develops
- **Most MTCs** (75-80%) arise **sporadically^Q**
- **Spread** is both **lymphatic** and **hematogenous^Q**
- **MC site of metastasis**: **Liver^Q**

Medullary Carcinoma Thyroid

Medullary Carcinoma Thyroid	
Sporadic: 80% ^a	Familial: 20% ^a (Non-MEN setting/ MEN-2A / MEN-2B)
<ul style="list-style-type: none"> • Originate in one lobe^a • Seen in 6th decade • RET protooncogene^a mutation 	<ul style="list-style-type: none"> • Multicentric and bilateral^a • Occur in younger age^a • Associated with C-cell hyperplasia^a • RET protooncogene^a mutation

Clinical features

Medullary carcinoma should be suspected
<ul style="list-style-type: none"> • High level of serum Calcitonin^a and CEA^a • Cervical lymph nodes at time of presentation (LN involvement, thyroid and blood borne metastases occurs early)^a • Diarrhea^a at the time of presentation. • Amyloid^a in stroma histologically. • MEN setting: Evidence of Pheochromocytoma/Hyperparathyroidism/Thyroid cancer in family. • (Discovery of medullary carcinoma thyroid makes family surveillance advisable)^a

Diagnosis

- Diagnosed by FNAC^a
- **I¹³¹ scan** is of **no use** as **MTC** is **TSH independent**^a.
- **Tumor marker**: **Calcitonin** is raised in **almost all cases** of **MTC**
- **Calcitonin** excess in **MTC** is **not associated** with **hypocalcemia**

Treatment

- **Total thyroidectomy + Central LN dissection ± Ipsilateral MRND** if tumor **>1 cm**^a
- If **nodes** are **positive** on **ipsilateral side**: **Bilateral MRND**

Follow up

- Level of **Calcitonin** falls after resection and is raised again in cases of recurrence, **used for follow up**^a.

Prognosis

- **MTC** is **associated** with **poor prognosis**^a.

52. Ans. c. Surgery only (Ref: Schwartz 10/e p1550, 9/e p1368; Sabiston 19/e p913; Bailey 26/e p769, 25/e p797)

Treatment of Medullary Carcinoma Thyroid

- **Pheochromocytoma** must be **operated on first**^a.
- These tumors are **generally (>50%) bilateral**. **Total thyroidectomy**^a is the treatment of choice for patients with **MTC** because of the **high incidence of multicentricity**, the **more aggressive course**, and the fact that **¹³¹I therapy** usually is **not effective**.
 - **Central compartment nodes** frequently are **involved early** in the disease process, so that a **bilateral central neck node dissection** should be **routinely performed**^a.
- In patients with palpable cervical nodes or involved central neck nodes, ipsilateral or bilateral, modified radical neck dissection is recommended.
- The role of prophylactic lateral neck dissection is controversial.
 - However, in patients with **tumors >1 cm**, **ipsilateral prophylactic modified radical neck dissection** is recommended because **>60%** of these patients have **nodal metastases**^a.
 - If **ipsilateral nodes** are **positive**, a **contralateral node dissection**^a should be performed.
- In the case of locally recurrent or metastatic disease, tumor debulking is advised not only to ameliorate symptoms of flushing and diarrhea, but also to decrease risk of death from recurrent central neck or mediastinal disease.
- External beam radiotherapy is controversial, but is recommended for patients with unresectable residual or recurrent tumor.
- There is **no effective chemotherapy regimen**^a.
- **Radiofrequency ablation** done laparoscopically appears promising in the palliative treatment of **liver metastases >1.5 cm**.
- In patients who have **hypercalcemia** at the time of thyroidectomy, only **obviously enlarged parathyroid glands** should be **removed**^a.
- The other parathyroid glands should be preserved and marked in patients with normocalcemia, as only about 20% of patients with MEN2A develop HPT.
- When a **normal parathyroid** cannot be maintained on a vascular pedicle, it should be removed, biopsied to confirm that it is a parathyroid, and then **autotransplanted** to the **forearm** of the **nondominant arm**^a.

- **Total thyroidectomy** is indicated in **RET mutation carriers** once the mutation is confirmed. The procedure should be performed **before age of 5 years** in MEN2A^Q patients and **before age 1 year old** in MEN2B patients^Q.

- **Central neck dissection** can be **avoided in children^Q** who are **RET**-positive and calcitonin-negative with a normal ultrasound examination.
- When the **calcitonin is increased** or the ultrasound suggests a **thyroid cancer**, a **prophylactic central neck dissection^Q** is indicated.

53. Ans. d. Take up radioiodine

- **I¹³¹ scan** is of no use as MTC is TSH independent^Q, so MTC does not take up radioiodine (I¹³¹).

54. Ans. c. Anaplastic carcinoma, e. Medullary carcinoma

- **Radioactive iodine** is used to destroy residual thyroid tissue (thyroid ablation) in well differentiated thyroid cancer.

55. Ans. All

56. Ans. d. 6 months (Ref: Schwartz 9/e p1368; Sabiston 19/e p913)

Prophylactic Thyroidectomy in RET Mutation Carriers		
MEN-2A	Before 5 years^Q	
MEN-2B	Before 1 year^Q	
<ul style="list-style-type: none"> • Central neck dissection is avoided in children^Q. • Indications of central neck dissection in children: <ol style="list-style-type: none"> 1. Raised calcitonin^Q 2. USG suggesting thyroid cancer^Q >5 mm 3. Evidence of LN metastasis 		

57. Ans. a. 5 years

58. Ans. None (Ref: Sabiston 19/e p912-913)

- Sabiston says "The **calcitonin excess** in MTC is **not associated with hypocalcemia**."^Q
- Robbins says "Notably **hypocalcemia** is **not a prominent feature** despite the **presence of raised calcitonin levels**."^Q

59. Ans. a. Parafollicular cells

60. Ans. a. Arises from parafollicular cells; b. Secretes calcitonin; c. Occurs in families; d. Amyloid in stroma; e. Commonly malignant

61. Ans. d. Medullary

62. Ans. c. TSH dependent

63. c. Surgery only

64. Ans. a. Medullary carcinoma thyroid

65. Ans. b. Calcitonin

66. Ans. c. CEA

67. Ans. c. Ret proto-oncogene

68. Ans. c. Total thyroidectomy and modified neck dissection on the side of enlarged lymph node

69. Ans. b. Medullary carcinoma

70. Ans. b. Medullary carcinoma

71. Ans. b. Medullary

72. Ans. b. Medullary

73. Ans. c. Medullary carcinoma

74. Ans. a. Total thyroidectomy

75. Ans. e. Total thyroidectomy + Radiotherapy

76. Ans. d. Histological mitochondria is essential for diagnosis

77. Ans. a. Ret proto oncogene

78. Ans. a. Diarrhea

79. Ans. b. Arises from parafollicular C cells

80. Ans. c. Increased calcitonin is not associated with hypocalcemia

81. Ans. c. It is dependent on TSH

ANAPLASTIC CARCINOMA

82. Ans. a. Common in elderly; d. Distant metastasis is common; e. Some degree of differentiation to papillary and follicular type is seen (Ref: Schwartz 10/e p1550, 9/e p1369; Sabiston 19/e p913-914; Bailey 26/e p768, 25/e p797; Harrison 18/e p2938)

Anaplastic carcinoma

- Accounts for **1%** of all thyroid malignancies
- **Mainly** affect **Women** in **7th** and **8th** decade^Q
- The typical patient has a **long-standing neck mass**, which **rapidly enlarges** and may be **painful**^Q.
- **Most aggressive** form of **thyroid cancer**^Q

Pathology

- **Grossly:** **Firm** and **whitish** in appearance.
- Microscopically, sheets of cells with marked heterogeneity and characteristic **giant** and **multinucleated cells**^Q.

Clinical features

- **Typical manifestation:** An **older patient** with **dysphagia**, **cervical tenderness** and a **painful, rapidly enlarging neck mass**^Q.
- **Superior vena cava syndrome** can also be part of the findings.
- The clinical situation **deteriorates rapidly** into **tracheal obstruction** and **rapid local invasion**^Q of surrounding structures.
- Associated symptoms: **Dysphonia**, **dysphagia** and **dyspnea**

- **Lymph nodes** usually are **palpable** at presentation.
- **Evidence of metastatic spread** also may be present.
- **MC site of metastasis:** **Lungs**^Q

Diagnosis

- Confirmed by **FNAC** revealing characteristic **giant** and **multinucleated cells**^Q.
- **Incisional biopsy** occasionally is needed to **confirm** the **diagnosis**

Treatment

- **Thyroidectomy** for **resectable mass**^Q (may lead to a small improvement in survival, especially in younger individuals)
- Combined **radiation** and **chemotherapy** in an adjuvant setting in patients with resectable disease has been associated with **prolonged survival**^Q.
- **Tracheostomy**^Q to alleviate **airway obstruction**.

Prognosis

- **Most aggressive thyroid malignancies**^Q, with **<6 months** survival

Anaplastic carcinoma

- On **gross inspection**, anaplastic tumors are **firm** and **whitish** in appearance.
- **Microscopically**, sheets of cells with **marked heterogeneity** are seen. Cells may be spindle shaped, polygonal, or large, multinucleated cells.
- **Foci** of more differentiated thyroid tumors, either **follicular** or **papillary**^Q, may be seen, suggesting that **anaplastic tumors** arise from more **well-differentiated tumors**^Q.

83. Ans. c. Long term survival in patient undergoing surgery; e. Highly Chemosensitive

84. Ans. d. Anaplastic carcinoma 85. Ans. d. Palliative/Symptomatic treatment

86. Ans. a. Common in elderly; b. Associated with p53 mutation; e. Lymphatic spread occur (Ref: Schwartz 9/e p1361; Sabiston 19/e p905)

87. Ans. d. Anaplastic

THYROID METASTASIS

88. Ans. c. Breast (Schwartz 10/e p1551, 9/e p1369)

Metastatic Tumors of Thyroid

- Rare, most cases are found in autopsy
- MC site of primary: **CA Breast**^Q > CA Lung
- If thyroid metastases is detected pre-mortem, MC site of primary: **RCC**^Q > CA Breast > CA Lung

Metastatic Tumor To	MC site of Primary
Thyroid	CA Breast ^Q > CA Lung
Kidney, Esophagus, Pancreas, Adrenal, Brain, Skin (KEPABS)	CA lung ^Q
Heart	CA lung in males ^Q CA breast in females ^Q
Testis	CA Prostate ^Q
Penis	CA urinary bladder ^Q
Leptomeningeal metastasis	CA breast ^Q
Lung	CA breast ^Q

THYROID LYMPHOMA

89. Ans. b. Slow growing (Ref: Schwartz 10/e p1551, 9/e p1369; Sabiston 19/e p914; Bailey 26/e p769, 25/e p798; Harrison 18/e p2938)

- Lymphomas of the thyroid gland are rapidly growing tumors and usually present with goiter that has grown significantly over a short period.

Thyroid Lymphoma

- Most common type is **NHL B cell**^Q type, of **intermediate** grade.
- Majority of patients have thyroid disease plus **cervical** or **mediastinal lymph nodes**^Q.
- More common in **females**.
- Most thyroid lymphomas **develop** in patients with **Chronic Lymphocytic Thyroiditis**^Q

Clinical Features

- Lymphomas are **rapidly growing tumours**, usually present with **rapidly enlarging neck mass** which is often **painless**.
- Patients may present with **acute respiratory distress** and **dysphagia**
- About **10-30%** present with symptoms relating to local invasion, including **hoarseness**, **dyspnoea** with stridor, or **dysphagia**.

- Painless**^Q and associated with **fever**^Q
- Patients with thyroid lymphoma virtually **never have hyperthyroidism** but frequently have **hypothyroidism**^Q.
- Hypothyroid patients have evidence of **autoimmune thyroiditis** or **Hashimoto's thyroiditis**^Q.

Diagnosis

- Diagnosis is confirmed by **core-needle biopsy**^Q.

Treatment: External beam radiotherapy + Chemotherapy^Q

- Patients with **thyroid lymphoma** respond rapidly to chemotherapy (**CHOP**—cyclophosphamide, doxorubicin, vincristine, and prednisone) and associated with **improved survival**.
- Combined treatment with **radiotherapy** and **chemotherapy** often is recommended.
- To alleviate **pressure symptoms**, **surgical resection** (Thyroidectomy and nodal dissection) is recommended

CARCINOMA THYROID

90. Ans. b. Follicular carcinoma -Most common type of carcinoma (Ref: Schwartz 9/e p1361; Sabiston 19/e p904; Bailey 26/e p763, 25/e p792)

Type of Thyroid Carcinoma	Prevalence
Papillary (MC)	80-90%
Follicular	5-10%
Medullary	10%
Anaplastic	Rare
Lymphoma	1-%

91. Ans. a. Follicular carcinoma have worse prognosis than papillary carcinoma; e. Follicular carcinoma have more male incidence than papillary carcinoma

92. Ans. b. Women <40 years; c. Papillary carcinoma <4cm (Ref: Schwartz 9/e p1362-1363; Sabiston 19/e p907; Bailey 26/e p766, 25/e p793-794; Harrison 17/e p2245)

Prognostic Risk Classification for Well Differentiated Thyroid Cancer (AMES or AGES)		
Features	Low Risk	High Risk
Age	<40 ^a years	>40 years
Metastasis	None	Regional or distant ^a
Size	<4 cm ^a	>4 cm
Grade	Well differentiated	Poorly differentiated ^a
Extent	No local extension, intrathyroidal, no capsular invasion	Capsular invasion, extrathyroidal extension ^a

Prognostic Indicators of Differentiated Thyroid cancer (PTC, FTC)

AGES scoring system^o

- Age, histologic Grade, Extrathyroidal invasion, and metastases and tumor Size to predict the risk of dying from papillary cancer.
- **Low-risk** patients are **young**, with **well-differentiated tumors**, **no metastases**, and **small primary lesions**
- High-risk patients are older, with poorly differentiated tumors, local invasion, distant metastases, and large primary lesions.

The MACIS scale^o

- This scale incorporates distant **Metastases**, **Age** at presentation (<40 or >40 years old), **Completeness** of original surgical resection, extrathyroidal **Invasion**, and **Size** of original lesion.

AMES system^o

- To classify differentiated thyroid tumors into low- and high-risk groups using **Age** (men <40 years old, women <50 years old), **Metastases**, **Extrathyroidal spread**, and **Size** of tumors (<5 or >5 cm).

93. Ans. c. Papillary type

94. Ans. b. Merkel cell

95. Ans. c. Is usually euthyroid

96. Ans. d. 50 milli curie (Schwartz 9/e p1365-1366; Sabiston 19/e p911; Bailey 25/e p797; Harrison 18/e p2937)

- Amount of I^{131} given for carcinoma thyroid is 50 milli curie (30-100 mCi).
- Schwartz says "If there is significant uptake, then a therapeutic dose of I^{131} , 30 to 100 mCi should be administered to low-risk patients and 100 to 200 mCi in high-risk patients."

97. Ans. a. Papillary

98. Ans. a. Recurrent laryngeal nerve palsy

- The **nerves** found in **close relationship** to **thyroid gland** and therefore likely to be **involved in malignant spread** and **thyroid surgery** are **recurrent laryngeal nerve** and **superior laryngeal nerve**.

99. Ans. a. I-131 (Ref: Schwartz 9/e p1365-1366; Sabiston 19/e p911; Bailey 26/e p767-768, 25/e p797; Harrison 18/e p2937 William's Endocrinology 10/e p479)

100. Ans. a. I-131

SOLITARY THYROID NODULE

101. Ans. c. USG (Ref: Schwartz 10/e p1540, 9/e p1360; Sabiston 19/e p900)

- PET scans are not routinely used in the evaluation of thyroid nodules, however, they may show clinically occult thyroid lesions.
- Emedicine-Medscape says "USG is the **most sensitive method** for **diagnosing intrathyroid lesions**"
- CT and MRI are neither specific nor sensitive in diagnosing the intrathyroid lesions.

Ultrasound in STN

- Ultrasound is helpful in assessing a thyroid nodule.
- **Advantages:** Portability, cost-effectiveness, and lack of ionizing radiation.
- It is **extremely useful** in patients who are being **managed conservatively**^o because it can easily determine whether a nodule has increased in size.
- Ultrasound is **used routinely**^o in the office setting and is also available for intraoperative evaluation.
- It has proved **highly effective** in determining the **location** and characteristics (**cystic versus solid**)^o of nodules but is unable to accurately predict the diagnosis of solid nodules.

Ultrasound features of carcinoma in a Thyroid Nodule	
Feature	Carcinoma/Malignancy
Structure	Hypoechoic/ Nonhomogeneous/ Solid ^o
Regressive changes	Rare
Microcalcifications	Common ^o
Peripheral rim	Variable
Internal vascularity	Common ^o (70-100 percent)
Lymph nodes	Relatively common ^o

102. Ans. d. Common in female; e. Thyroidectomy done (Ref: Schwartz 10/e p1537-1539, 9/e p1358-1361; Harrison 18/e p2938-2939, 17/e p2122-2123; Robbins 7/e p1175)

Solitary Thyroid Nodule

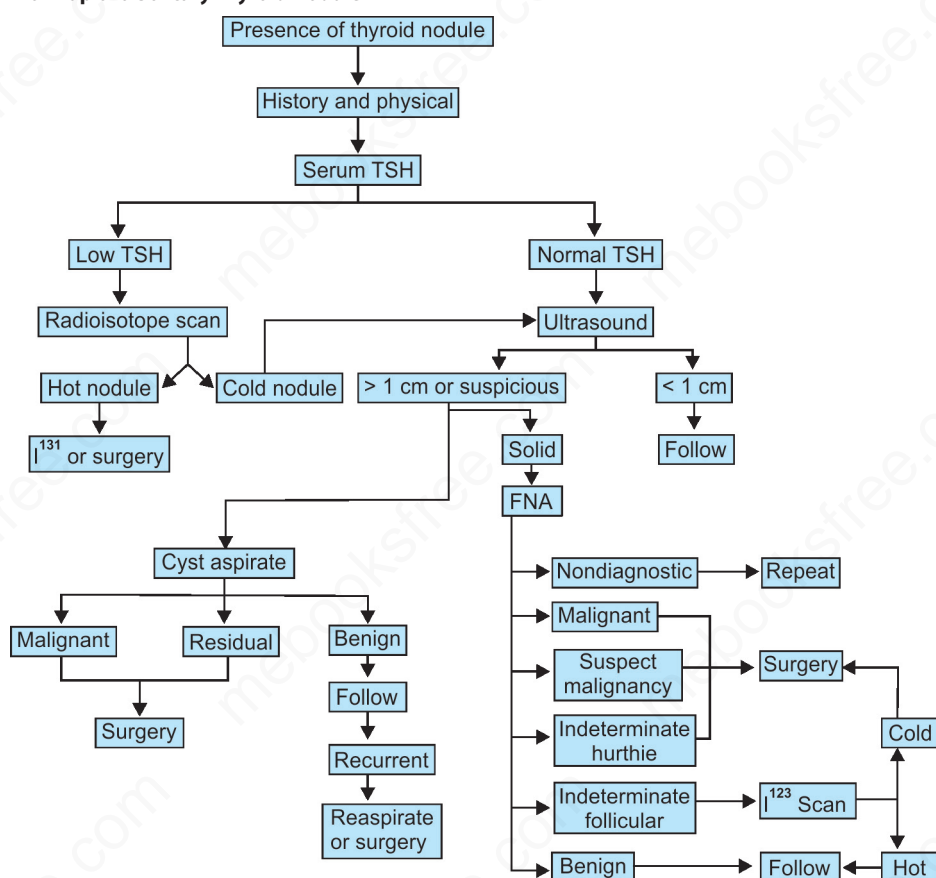
- **Palpable discrete swelling** within an otherwise apparently normal thyroid gland.
- Incidence in adults is **1-10%**.
- STN are **4 times more common** in **women**^Q than in men.
- There is **nodular hyperplasia**^Q (not the diffuse hyperplasia)
- **THR-Ab** is **not found** in STN.
- STN are more likely to be neoplastic than multiple nodules.
- Nodules in **younger patients** are **more likely** to be **neoplastic**^Q than those in older patients.
- History of **radiation exposure** **increases** the **risk of malignancy**^Q.
- **Cold nodules** (don't take up radioactive iodine) are **more likely** to be **malignant (15-20%)**^Q than **hot** (take up radioactive iodine) nodules (**1-3%**)^Q
- STN are **removed surgically**^Q to exclude malignancy.

103. Ans. c. FNAC (Ref: Schwartz 10/e p1538, 9/e p1358; Sabiston 19/e p899)

- FNAC is the **investigation of choice in discrete thyroid swellings**, offers excellent patient compliance and is easy and quick to perform^Q.
- FNAC cannot distinguish between **benign follicular adenoma** and **follicular carcinoma**^Q.

104. Ans. c. Thyroid function test (Ref: Sabiston 19/e p899; Harrison 18/e p2938-2939, 17/e p2122-2123)

Work-up of a Solitary Thyroid Nodule



- Initial investigation done in STN is **thyroid function test (TFT)**^Q.
- Investigation of choice in STN for diagnosis is **FNAC**^Q.

Solitary Thyroid Nodule

- Initial investigation done in STN is **thyroid function test (TFT)**^Q.
- If TFT is **raised**, next investigation is **thyroid scan**, (For **hot nodules**, RAI ablation or surgery is done; For **warm or cold nodules**, follow-up or surgery)^Q.
- If TFT is **normal**, **USG** is done (Aspiration in cystic lesions, FNAC for solid or heterogenous lesions)^Q.
- Investigation of choice in STN for diagnosis is **FNAC**^Q.

105. Ans. d. FNAC

106. Ans. c. Right hemithyroidectomy

107. Ans. a. 5%

108. Ans. a. Cold nodule on thyroid scan is diagnostic of malignancy (Ref: Schwartz 10/e p1537, 9/e p1358; Sabiston 19/e p899; Bailey 25/e p783; Chandrasoma Taylor 3/e p849-850; Harrison 18/e p2938-2939, 17/e p2122-2123)

Solitary Thyroid Nodule

- MC solitary thyroid nodule is **benign colloid nodule**^Q, it accounts for **60%** cases of solitary thyroid nodule.
- 2nd MC cause of solitary thyroid nodule is **follicular adenoma** (30%)^Q.

History

- Details regarding the nodule, such as time of onset, change in size, and associated symptoms such as pain, dysphagia, dyspnea, or choking, should be elicited.
- Risk factors for malignancy, such as exposure to **ionizing radiation** and **family history of thyroid and other malignancies**^Q associated with thyroid cancer. Risk factors for malignancy, such as exposure to **ionizing radiation** and **family history of thyroid and other malignancies**^Q associated with thyroid cancer.

External Beam Radiation

- **Low-dose therapeutic radiation**^Q has been used to treat conditions such as tinea capitis, thymic enlargement, enlarged tonsils and adenoids, acne vulgaris, and other conditions such as hemangioma and scrofula.
- **History of exposure to low-dose ionizing radiation**^Q to the thyroid gland places the patient at **increased risk** for developing **papillary thyroid cancer**^Q.
- Risk is **maximum 20 to 30 years** after exposure^Q

Physical Examination

- Thyroid gland is **best palpated from behind** the patient and with the **neck in mild extension**^Q.
- Nodules that are **hard, gritty, or fixed to surrounding structures** such as the trachea or strap muscles are **more likely to be malignant**^Q.

Diagnostic Investigations

Laboratory Studies

- **Most patients with thyroid nodules** are **euthyroid**^Q.
- Determining the **blood TSH level**^Q is helpful.
- **Risk of malignancy: 1% in hyperthyroid** nodules
- **Tg levels in patients** who have undergone total thyroidectomy for thyroid cancer and **for serial evaluation** of patients undergoing nonoperative management of thyroid nodules.
- **Serum calcitonin** in patients with **MTC** or a family history of MTC or **MEN2**.

FNAC

- **Single most important test** in the evaluation of **thyroid masses**^Q
- **Ultrasound guidance** is recommended for nodules that are **difficult to palpate** and for **cystic or solid-cystic nodules** that **recur**^Q after the initial aspiration.
- A **23-gauge needle** is used
- If a FNAC is reported as **nondiagnostic**, it generally **should be repeated**.
- **Benign lesions** include **cysts** and **colloid nodules**. The risk of malignancy in this setting is **<3%**.
- When **FNAC** is used in **complex nodules**, the **solid portion** should be **sampled**^Q.

FNAC

- The **risk of malignancy** in the setting of a **suspicious cytology** is about **20%**. Most of these lesions are **follicular or Hürthle cell neoplasms**. In this situation, **diagnosis of malignancy** relies on demonstrating **capsular or vascular invasion**, features that cannot be determined via FNAC.
- FNAC also is **less reliable** in patients who have a **history of head and neck irradiation** or a **family history** of thyroid cancer, due to **higher likelihood** of **multifocal lesions** and **occult cancer**^Q.

Imaging

- **Ultrasound** is helpful for detecting **nonpalpable thyroid nodules**, differentiating **solid from cystic nodules**, and **identifying adjacent lymphadenopathy**.
- Ultrasound evaluation can identify features of a nodule that increase the **risk of malignancy**, such as **fine stippled calcification** and **enlarged regional nodes**; however, a **tissue diagnosis** is **strongly recommended before thyroidectomy**^a.
- **Scanning** the thyroid with ¹²³I or ^{99m}Tc is **rarely necessary**, and thyroid scanning currently is **recommended** in the assessment of **thyroid nodules** only in patients who have **follicular thyroid nodules** on **FNAC** and a **suppressed TSH**^a.

Management

- **Total thyroidectomy for malignant tumors**^a

Thyroid Cyst

- **Simple thyroid cysts** resolve with **aspiration**^a in about 75% of cases
- Hemithyroidectomy:
- If the cyst **persists after three attempts** at aspiration^a
- **Cysts >4 cm** in diameter^a
- **Complex cysts** with solid and cystic components (higher incidence of malignancy, 15%).

Colloid nodule

- **Observation** with serial **ultrasound** and **Tg** measurements^a.
- If the **nodule enlarges**, **repeat FNAC** often is indicated.
- Although controversial, **L-thyroxine** in doses sufficient to maintain a serum TSH level between 0.1 and 1.0 U/mL may also be administered.
- Approximately **50%** of these **nodules decrease in size** in response to the **TSH suppression** of this regimen, and others may not continue to grow, but it is **most effective for nodules <3 cm**^a.
- **Hemithyroidectomy**: If a **nodule enlarges** on **TSH suppression**, causes **compressive symptoms**, or for **cosmetic reasons**^a.
- **Total thyroidectomy**: Patient who has had **previous irradiation** of the **thyroid gland** or has a **family history of thyroid cancer**, because of the **high incidence of thyroid cancer** and **decreased reliability of FNAC** in this setting^a.

Familial Cancer Syndromes Involving Nonmedullary Thyroid Cancer

Syndrome	Gene	Manifestation	Thyroid Tumor
Cowden's syndrome	PTEN	Intestinal hamartomas, benign and malignant breast tumors	FTC , rarely PTC and Hürthle cell tumors
FAP	APC	Colon polyps and cancer, duodenal neoplasms, desmoids	PTC cribriform growth pattern
Werner's syndrome	WRN	Adult progeroid syndrome ^a	PTC, FTC, anaplastic cancer
Carney complex type 1	PRKAR1	Cutaneous and cardiac myxomas, breast and adrenal tumors ^a	PTC, FTC
McCune-Albright syndrome	GNAS1	Polyostotic fibrous dysplasia, endocrine abnormalities, café-au-lait spots ^a	PTC clear cell

109. Ans. a. Follicular adenoma

- MC STN is colloid goiter > follicular adenoma.

110. Ans. b. Hemithyroidectomy (Ref: Schwartz 10/e p1540, 9/e p1358-1361; Harrison 18/e p2938-2939)

Hemithyroidectomy

- Hemithyroidectomy is **removal of one lobe** with isthmus.
- Hemithyroidectomy is **treatment of choice** for **follicular adenoma** and **solitary thyroid nodule**.

111. Ans. c. 20% (Ref: Bailey 25/e p779)

- About 80% of discrete swellings are cold. The risk of malignancy is higher in "cold" lesions (20%) compared to "hot" or "warm" lesions (< 5%).

112. Ans. b. FNAC

GOITRE

113. Ans. c. 30% (Ref: Bailey 26/e p749, 25/e p778)

Complications of Multi-nodular Goiter

- Secondary Thyrotoxicosis:** Transient episodes of mild hyperthyroidism are common, occurring in up to 30%^Q of patients.
- Carcinoma:** An increased incidence of cancer (usually **follicular**) has been reported from **endemic areas**^Q.

114. Ans. b. Diffuse goiter (Ref: Harrison 18/e p2931; Bailey 26/e p747, 24/e p782)

Endemic Goiter

- Worldwide, **diffuse goiter** is most commonly caused by **iodine deficiency** and is termed **endemic goiter** when it affects >5%^Q of the population.
- Endemic goiter occurs in **geographical areas** where the **soil, water** and **food** supply contains **low levels of iodine**^Q.
- The **lack of iodine** leads to decreased synthesis of thyroid hormones and a **compensatory increase in TSH** which in turn leads to **follicular cell hypertrophy** and **hyperplasia** and goitrous enlargement leading to **diffuse hyperplastic goiter**^Q.
- Mostly, patients** are **euthyroid**^Q.

115. Ans. a. Neck (Ref: Schwartz 10/e p1554, 9/e p1372, 8/e p1428)

- Virtually all **intrathoracic goiters** can be **removed via a cervical incision**^Q.

Surgical Removal of Intrathoracic Goiter

- A goiter is considered **mediastinal** if at least 50%^Q of the **thyroid tissue** is **located intrathoracically**.

Primary Mediastinal Goiters	Secondary Mediastinal Goiters
<ul style="list-style-type: none"> Constitute approximately 1% of all mediastinal goiters Arise from accessory (ectopic)^Q thyroid tissue located in the chest Supplied by intrathoracic blood vessels^Q Do not have any connection to thyroid tissue in the neck^Q. 	<ul style="list-style-type: none"> Constitute majority^Q of mediastinal goiters Arise from downward extension of cervical thyroid tissue^Q along the fascial planes of the neck and Derive their blood supply from the superior and inferior thyroid arteries^Q.

Removal

- Virtually all **intrathoracic goiters** can be **removed via a cervical incision**^Q.

Indications of Median Sternotomy

Patients who have:

- Invasive thyroid cancers**^Q
- Had **previous thyroid operations** and may have developed **parasitic mediastinal vessels**^Q
- Primary mediastinal goiters with no thyroid tissue in the neck**^Q

- The **chest** should be **prepared in most cases** in the event it is necessary to perform a median sternotomy to control mediastinal bleeding or completely remove an unsuspected invasive cancer.
- The goiter is **approached via a neck incision**^Q.
- When sternotomy is indicated, the **sternum usually should be divided** to the level of the **third intercostal space** and then laterally on one side at the **space between the third and fourth ribs**.

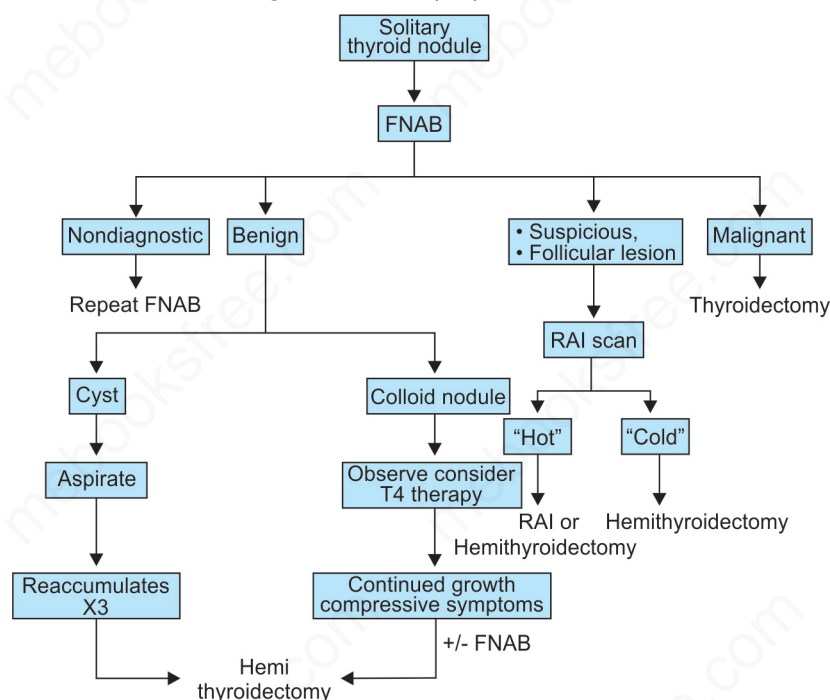
116. Ans. b. Thyroid scan (Ref: Sabiston 19/e p901; Schwartz 10/e p1537, 9/e p1360)

Thyroid scan

- Whereas ultrasound allows anatomic evaluation, **radionuclide scans** allow assessment of **thyroid function**^Q.
- ¹²³I and ¹³¹I iodine scintigraphy is also used to evaluate the functional status of the gland
- Advantages of scanning with ¹²³I include a **low dose of radiation** (30 mrad) and **short half-life**^Q.
- ¹³¹I has a **longer half-life** (8 days) and **emits higher levels of β -radiation**^Q.
- ¹³¹I is optimal for **imaging thyroid carcinoma**. It is the **screening modality of choice** for the **evaluation of distant metastasis**^Q.

Isotope	$t_{1/2}$
¹³² I	2.3 hours ^Q
¹²³ I	13 hours ^Q
¹³¹ I	8 days ^Q

Management of Solitary Thyroid Nodule



117. Ans. a. Cosmetic; b. Pressure symptoms; e. Swelling with symptoms (Ref: Schwartz 9/e p1358; Sabiston 19/e p903; Harrison 18/e p2931-2932)

Indications of Surgery in Thyroid Swelling

- Neoplasia (FNAC positive, clinical suspicion)^Q
- Toxic adenoma^Q
- Pressure symptoms^Q
- Cosmetic reason or patient's preference^Q

118. Ans. b. Hemithyroidectomy

119. Ans. None

120. Ans. d. 10-20%

- Cold nodules** (don't take up radioactive iodine) are **more likely to be malignant (15-20%)**^Q than **hot** (take up radioactive iodine) nodules (1-3%)^Q

121. Ans. d Hemithyroidectomy

122. Ans. d. Goitre more than 5 percent of population is endemic goitre (Ref: Harrison 18/e p2931; Bailey 24/e p782)

123. Ans. c. All nodules > 4 cm should be resected irrespective of cytology (Ref: Schwartz 9/e p1358; Sabiston 19/e p899; Harrison 18/e p2938-2939)

All nodules > 4 cm should be resected irrespective of cytology, is an incorrect statement.

Solitary Thyroid Nodule:

- If the **serum TSH** is **subnormal**, a **radionuclide thyroid scan** should be obtained using either **Tc-99 pertechnetate** or **I-123** to document whether the nodule is **hyperfunctioning, isofunctioning or nonfunctioning** (Ref: *American Thyroid Association, Thyroid Nodule Guidelines*)
- **Cold nodules** (don't take up radioactive iodine) are **more likely** to be **malignant (15-20%)**^Q than **hot** (take up radioactive iodine) **nodules (1-3%)**^Q
- **FNAC** is the **investigation of choice in discrete thyroid swellings**, offers excellent patient compliance and is easy and quick to perform.
- **Treatment options for Colloid Nodule:**
 - Approximately **50%** of these **nodules decrease in size** in response to the **TSH suppression** of this regimen, and others may not continue to grow, but it is **most effective for nodules <3 cm**^Q
 - **Hemithyroidectomy:** If a **nodule enlarges on TSH suppression**, causes **compressive symptoms**, or for **cosmetic reasons**^Q.
 - **Total thyroidectomy:** Patient who has had **previous irradiation of the thyroid gland** or has a **family history of thyroid cancer**, because of the **high incidence of thyroid cancer** and **decreased reliability of FNAC** in this setting^Q.

RETROSTERNAL GOITRE

124. Ans. c. Dyspnea (Ref: *Schwartz 9/e p1358; Sabiston 19/e p898; Bailey 26/e p753-754, 25/e p782*)

Retrosternal Goiter

- A goiter is said to be retrosternal, substernal or mediastinal if **more than half of thyroid tissue is below the opening of thoracic cage**^Q.
- Usually arises from **lower pole** of a **nodular goiter**^Q.
- **Often symptomless, discovered on a routine chest X-ray**^Q.
- **Tracheal deviation and scabard trachea**^Q (flattening of trachea caused by compression)

Severe symptoms due to mass effect on the trachea, esophagus, great vessels and nerves

1. **Dyspnea (MC symptom)** particularly at night, **cough** and **stridor**^Q
2. Dysphagia
3. Enlargement of neck veins and superficial veins on the chest wall
4. Recurrent nerve palsy
5. **Pemberton's sign**^Q: Symptoms of faintness with evidence of facial congestion and external jugular venous obstruction when the arms are raised above the head.

125. Ans. d. All

126. Ans. a. Stridor

THYROTOXICOSIS

127. Ans. a. Inadequate control of hyperthyroidism (Ref: *Schwartz 10/e p1534, 9/e p1355; Sabiston 19/e p897; Bailey 26/e p754-758, 25/e p786-787; Harrison 18/e p2927*)

Thyroid Storm (Thyrotoxic crisis)

- It is an **emergency** due to **decompensated hyperthyroidism**^Q.

Treatment

- **Non-selective beta-blocker (Propranolol):**
 - **Most valuable measure in thyroid storm**^Q.
 - In thyroid storm most of the symptoms are because of adrenergic over activity due to **increased tissue sensitivity to catecholamines** in hyperthyroidism.
 - This **increased sensitivity** is due to **increased number of beta receptors**^Q.
- Quick relief is obtained by blocking **beta receptors**.
- **Propylthiouracil:**
 - **Antithyroid drug of choice for thyroid storm**^Q
 - **Reduces hormone synthesis** as well as **peripheral conversion of T₄ to T₃**^Q
- **Corticosteroids (Hydrocortisone):**
 - **Inhibits both release of thyroid hormone from the gland and peripheral conversion of T₄ to T₃**^Q
- **Iodides (Potassium iodide or ipanoic acid):**
 - Used to **inhibit further hormone release**^Q from the gland.
- **Other Measures:**
 - **Diltiazem**, if **tachycardia** is not controlled by propranolol alone.
 - **Rehydration, anxiolytics, external cooling** and appropriate antibiotics

128. Ans. b. Propylthiouracil (Ref: Harrison 17/e p47)

Hyperthyroidism in Pregnancy

- Hyperthyroidism in pregnancy should be **aggressively evaluated and treated**^Q.
- It is **most commonly** caused by **Graves disease**^Q, but autonomously functioning nodules, gestational trophoblastic disease, thyroiditis, and hyperemesis gravidarum should also be considered.
- Hyperthyroidism is **most difficult to control** in the **first trimester**^Q of pregnancy and **easiest to control** in the **third trimester**^Q.
- **Methimazole** crosses the **placenta** to a **greater degree than propylthiouracil** and has been associated with **fetal aplasia cutis**^Q.
- Treatment of choice is **propylthiouracil**^Q.
- **Radioiodine should not be used during pregnancy**, either for scanning or treatment, because of effects on the fetal thyroid.

129. Ans. a. Diastolic murmur (Ref: Harrison 18/e p2923)

CVS Findings in Thyrotoxicosis

- **MC cardiovascular manifestation** is **sinus tachycardia**^Q, often associated with **palpitations**, occasionally caused by **supraventricular tachycardia**^Q.
- **Exertional dyspnea**^Q
- Hyperactive precordium with **loud first heart sound**, an accentuated pulmonic component of the second heart sound, and a **thirds heart sound**^Q.
- **Systolic ejection click**^Q
- The high cardiac output produces a **bounding pulse**, **widened pulse pressure**^Q, and an **aortic systolic murmur** and can lead to worsening of angina or heart failure in the elderly or those with preexisting heart disease.
- **Atrial fibrillation** is more common in patients **>50 years of age**^Q.
- A systolic scratch, also known as **Means-Lerman scratch**^Q, is occasionally heard in 2nd left intercostal space during expiration.
- **Systolic hypertension**

Cardiovascular manifestations of Thyrotoxicosis	
Increased Atrial irritability	High Cardiac Output
<ul style="list-style-type: none"> • Sinus tachycardia (MC)^Q • Palpitations^Q • Supraventricular tachycardia^Q • Atrial fibrillations^Q 	<ul style="list-style-type: none"> • Bounding pulse • Wide pulse pressure^Q • Hyperdynamic precordium^Q • Loud first heart sound^Q, an accentuated pulmonic component of the second heart sound, and a thirds heart sound^Q. • Aortic systolic murmur^Q • Means-Lerman scratch^Q

130. Ans. a. Thyrotoxicosis (Ref: Harrison 18/e p2923; 16th/2108)

Dancing Carotids may be seen in

- Aortic regurgitation^Q
- Thyrotoxicosis^Q

131. Ans. c. TSH (Ref: Schwartz 9/e p1349; Sabiston 19/e p893; Bailey 26/e p743, 25/e p773; Harrison 18/e p2917)

The **ultrasensitive TSH assay** has become the **most sensitive and specific test** for the **diagnosis of hyper- and hypothyroidism** and for **optimizing T₄ therapy**^Q.

The enhanced sensitivity and specificity of TSH assays have greatly improved laboratory assessment of thyroid function^Q.

132. Ans. a. Primary hypothyroidism (Ref: Harrison 18/e p2920-2921)

- A **normal TSH level excludes primary** (but not secondary) **hypothyroidism**^Q.
- If the TSH is elevated, an **unbound T₄ level** is **needed to confirm the presence of clinical hypothyroidism**^Q, but T₄ is inferior to TSH when used as a screening test, because it will not detect subclinical hypothyroidism.

133. Ans. b. Wolff-Chaikoff effect (Ref: Schwartz 10/e p1526, 9/e p1348; Sabiston 19/e p892; Harrison 17/e p2241)

Wolff-Chaikoff effect	<ul style="list-style-type: none"> • Iodine induced hypothyroidism^Q (Iodine dependent transient thyroid suppression)
Jod-Basedow's effect	<ul style="list-style-type: none"> • Iodine induced hyperthyroidism^Q

134. Ans. d. Oxygen consumption (Ref: Harrison 18/e p2926; 17/e p2236)

- Beta-blockers do not correct the underlying metabolic abnormalities (i.e. does not affect the oxygen consumption)

Beta-Blockers in Thyrotoxicosis	
Advantages	Limitations
Alleviates adrenergic manifestations: <ul style="list-style-type: none"> • Sweating, tremor^Q • Tachycardia, palpitations^Q • Nervousness, anxiety^Q 	<ul style="list-style-type: none"> • Beta-blockers do not significantly affect the thyroid status^Q, it reduces to some extent the conversion of T₄ to T₃. • Beta-blockers do not correct^Q the underlying metabolic abnormalities (i.e. does not affect the oxygen consumption)^Q

135. Ans. a. Surgery for thyroiditis

136. Ans. a. Early diastolic murmur

137. Ans. b. Radioactive iodine

138. Ans. d. Elevated serum CPK level

- Both thyrotoxicosis and malignant hyperthermia may cause myopathy, but in hyperthyroidism serum CPK is often normal.

139. Ans. d. All

140. Ans. a. Hot nodule (Ref: Schwartz 10/e p1533, 9/e p1355; Sabiston 19/e p896; Bailey 26/e p755, 25/e p783; Harrison 18/e p2932)

Toxic Adenoma (Plummer's Disease)

- Hyperthyroidism from a **single hyperfunctioning nodule^Q** typically occurs in **younger patients**
- Usually occurs in the setting of a patient with endemic goiter.
- Increased thyroid hormone production occurs **independent of TSH control^Q**.
- **Recent growth** of a **long-standing nodule** along with the symptoms of **hyperthyroidism^Q**.
- Characterized by **somatic mutations** in the **TSH-R gene^Q**
- Most nodules have attained a **size** of at least **3 cm** before **hyperthyroidism** occurs.

Clinical Features

- **Recent growth** of a **long-standing nodule** along with the symptoms of **hyperthyroidism^Q**.
- Hyperthyroidism from a **single hyperfunctioning nodule** typically occurs in **younger patients**
- Physical examination: **Solitary thyroid nodule** without palpable thyroid tissue on the contralateral side.
- Eye signs are not common, mainly **CVS dysfunction**
- These nodules are **rarely malignant^Q**.

Diagnosis

- **RAI scanning** shows a **"hot" nodule^Q** with suppression the rest of the thyroid gland.

Treatment

- **Smaller nodules** may be managed with **antithyroid medications** and **RAI^Q**.
- **Most patients** are **euthyroid** after **radioiodine therapy^Q** (radioiodine preferentially accumulates in hyperfunctioning nodules)
- Surgery (**Hemithyroidectomy**) is preferred in **young patients** with **larger nodules^Q**.

141. Ans. a. Inadequate control of hyperthyroidism

142. Ans. b. Increased CPK levels

143. Ans. a. Thyroid storm

144. Ans. a. Hashimoto's thyroiditis

145. Ans. b. Graves' disease; c. Medullary thyroid carcinoma; d. Plummer's disease; e. Struma ovarii (Ref: Harrison 18/e p1922; Robbins 7/e p1167)

Causes of Thyrotoxicosis		
Primary hyperthyroidism	Thyrotoxicosis without hyperthyroidism	Secondary hyperthyroidism
<ul style="list-style-type: none"> • Graves' disease^Q • Toxic multinodular goiter • Toxic adenoma (Plummer's disease)^Q • Functioning thyroid carcinoma metastases^Q • Activating mutation of the TSH receptor • McCune-Albright syndrome • Struma ovarii^Q • Drugs: iodine excess (Jod-Basedow phenomenon)^Q 	<ul style="list-style-type: none"> • Subacute thyroiditis • Silent thyroiditis • Other causes of thyroid destruction: amiodarone, radiation, infarction of adenoma • Ingestion of excess thyroid hormone (thyrotoxicosis factitia) or thyroid tissue 	<ul style="list-style-type: none"> • TSH-secreting pituitary adenoma • Thyroid hormone resistance syndrome: occasional patients may have features of Thyrotoxicosis • Chorionic gonadotropin-secreting tumors • Gestational thyrotoxicosis

146. Ans. b. Cold intolerance

147. Ans. d. Hair loss

148. Ans. a. Iodides

149. Ans. d. (Inadequate preoperative preparation)

GRAVE'S DISEASE

150. Ans. a. More common in males (Ref: Schwartz 10/e p1531-1533, 9/e p1353-1354; Sabiston 19/e p896-898; Bailey 26/e p755-758, 25/e p783-787; Harrison 18/e p2922-2927)

Grave's Disease (Diffuse Toxic Goiter)

- **MC cause of hyperthyroidism**, caused by **stimulatory autoantibodies to TSH-R^Q**.
- **Autoimmune disease** with strong **familial predisposition^Q**
- More common in **females** with peak incidence between **40–60 years**
- Characterized by **thyrotoxicosis**, **diffuse goiter** and **extrathyroidal conditions^Q** (ophthalmopathy, dermopathy, thyroid acropachy and gynecomastia)

Etiopathogenesis

- **Autoimmune process** with possible **triggers** (post-partum state, iodine excess, lithium therapy and bacterial or viral infections)
- Associated with **HLA-B8, HLA-DR3, HLA-DQA1*0501 and CTLA-4^Q**
- **HLA-DRB1*0701** is **protective** against it
- **Thyroid stimulating antibodies^Q** stimulate thyrocytes to grow and synthesize excess thyroid hormone, which is **hallmark** of Grave's disease
- Associated with **type I diabetes mellitus, Addison's disease, pernicious anemia and myasthenia gravis**

Histopathology

- **Hyperplastic gland** with columnar epithelium and minimal colloid
- Nuclei exhibit **mitosis**
- **Papillary projections of hyperplastic epithelium^Q**

Clinical Features

- **Hyperthyroid symptoms^Q** (heat intolerance, increased sweating and thirst, weight loss despite adequate caloric intake)
- **Symptoms of adrenergic stimulation^Q** (palpitations, nervousness, fatigue, emotional lability, hyperkinesis and tremors)
- **MC GI symptom is increased frequency of bowel movements and diarrhea^Q**

- **Female patients** often develop **amenorrhea, decreased fertility** and **increased incidence of miscarriage^Q**
- **Children** experience **rapid growth** with **early bone maturation^Q**
- **Older patients** present with **CVS complications (AF and CHF)^Q**
- **Overt cardiac failure** occurs in **only 6–19%, in greases with are**

- Weight loss, facial flushing, warm and moist skin, tachycardia, cutaneous vasodilatation, **collapsing pulse** is seen on examination
- A **fine tremor, muscle wasting** and **proximal muscle group weakness** with **hyperactive tendon reflexes** often are present^Q

- **Overlying bruit or thrill at upper pole^Q** due to **increased vascularity**
- **Loud venous hum^Q** in supraclavicular space
- **Ophthalmopathy** (orbital proptosis) occurs in **50%, dermopathy in 1-2%.^Q**
- Dermopathy is characterized by deposition of **glycosaminoglycans** leading to **thickened skin in pretibial region** and **dorsum of foot^Q** (pretibial myxedema).

- **Gynecomastia** is common in **young men^Q**
- Rare bony involvement leads to **subperiosteal bone formation** and **swelling in metacarpals^Q** (thyroid acropachy)

Diagnosis

- **Suppressed TSH** with or without an elevated free T4 or T3 level. **If eye signs are present**, other tests are generally not needed^Q.
- In absence of eye signs, **elevated RAIU with diffusely enlarged gland^Q** confirms the diagnosis
- **Elevated TSH-R or thyroid-stimulating antibodies (TSAb)** are **diagnostic^Q** of Grave's disease and increased in about **90%** patients
- **Anti-Tg and Anti-TPO antibodies** are **non-specific** and elevated in upto **75%** cases.
- **MRI of orbits** are useful in evaluating **Grave's ophthalmopathy**

Treatment

- Treatment modalities: **Antithyroid drugs**, thyroid ablation with radioactive ¹³¹I and **thyroidectomy^Q**.

151. Ans. None

152. Ans. d. All of the above (Ref: William's Endocrinology 10/e p479)

Complications of Radioactive Iodine (I ¹³¹) Therapy			
Acute		Long-Term	
<ul style="list-style-type: none"> • Neck pain, swelling, tenderness • Thyroiditis, sialadenitis • Hemorrhage^Q (brain metastasis) • Cerebral edema^Q (brain metastasis) • Vocal cord paralysis^Q • Nausea and vomiting^Q • Bone marrow suppression^Q 		<ul style="list-style-type: none"> • Hematologic: <ul style="list-style-type: none"> - Bone marrow suppression^Q • Fertility: <ul style="list-style-type: none"> - Ovarian and testicular damage • Pulmonary fibrosis • Chronic sialadenitis, taste dysfunction • Hypoparathyroidism^Q • Increased risk of cancer: <ul style="list-style-type: none"> • Anaplastic thyroid cancer^Q • HCC 	
		<ul style="list-style-type: none"> - Leukemia^Q 	<ul style="list-style-type: none"> - Infertility - Increased abortion rate
		<ul style="list-style-type: none"> • Gastric cancer • Lung, bladder and breast cancer 	

153. Ans. d. Hypothyroidism

154. Ans. b. Age >40 years; c. Elderly; e. Presence of associated co-morbidities (Ref: Schwartz 10/e p1532-1533, 9/e p1354-1355; Sabiston 19/e p897-898; Bailey 26/e p757-758, 25/e p786-787; Harrison 18/e p2925-2927)

Treatment of Grave's Disease

- Treatment modalities are antithyroid drugs, thyroid ablation with radioactive ^{131}I , and thyroidectomy.

Antithyroid Drugs

- Administered in **preparation for RAI ablation or surgery**^Q.
- Drugs commonly used: **Propylthiouracil** and **methimazole**^Q.
- Most patients have **improved symptoms in 2 weeks** and become **euthyroid** in about **6 weeks**^Q.
- Treatment is associated with a **high relapse rate** when these drugs are discontinued, with 40-80% of patients developing recurrent disease after a 1- to 2-year course.
- Patients with **small glands** are **less likely to recur**.

Treatment for curative intent is reserved for

- Small, nontoxic goiters** <40 gms^Q
- Mildly elevated** thyroid hormone levels^Q
- Rapid decrease in gland size** with antithyroid medications^Q

- The catecholamine response of thyrotoxicosis can be **alleviated** by **propranolol**^Q.

Radioactive Iodine Therapy (^{131}I)

- ^{131}I emits **beta** (90%) and **gamma rays**^Q

Radioactive Iodine Therapy

Advantages	Disadvantages
<ul style="list-style-type: none"> Avoidance of a surgical procedure^Q and its concomitant risks Reduced overall treatment costs^Q Ease of treatment^Q 	<ul style="list-style-type: none"> Progression of Grave's ophthalmopathy^Q Small increased risk of nodular goiter, thyroid cancer and hypoparathyroidism^Q Unexplained increase in overall and cardiovascular mortality^Q Higher initial dose of ^{131}I: Earlier onset and higher incidence of hypothyroidism^Q

Indications of RAI Therapy

- Older patients** with **small or moderate-sized goiters**^Q
- Patients **relapsed after medical or surgical therapy**^Q
- Antithyroid drugs or surgery** are **contraindicated**^Q

- After standard treatment with RAI, most patients become euthyroid within 2 months.
- Only 50% of patients treated with RAI are euthyroid 6 months after treatment, and the remaining are still hyperthyroid or already hypothyroid.

Contraindications of RAI

Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none"> Pregnancy^Q Lactation^Q 	<ul style="list-style-type: none"> Young patients (children and adolescents)^Q Thyroid nodules^Q Ophthalmopathy^Q

Surgical Treatment

- Surgery is recommended** when **RAI is contraindicated**^Q

Indications of Surgery

When RAI is contraindicated	Relative indications
<ul style="list-style-type: none"> Confirmed cancer or suspicious thyroid nodules^Q Young patients^Q Pregnancy and Lactation^Q Severe reactions to antithyroid medications Large goiters causing compressive symptoms Reluctant to undergo RAI therapy 	<ul style="list-style-type: none"> Smokers, with moderate to severe Grave's ophthalmopathy^Q Patients desiring rapid control of hyperthyroidism with a chance of being euthyroid Poor compliance to antithyroid medications.

- Patients should be **rendered euthyroid before operation**^Q
- **Antithyroid drugs** should be continued **up to the day of surgery**^Q.

Lugol's Iodide Solution or Saturated Potassium Iodide

- Administered **7-10 days preoperatively** (three drops twice daily)^Q
- **Reduce vascularity** of the gland and **decrease the risk of precipitating thyroid storm**.
- The **major action** of iodine in this situation is to **inhibit release of thyroid hormone**^Q.

Indications of Total or near-total thyroidectomy

- Patients with **coexistent thyroid cancer**^Q
 - Who **refuse RAI therapy**^Q
 - Have **severe ophthalmopathy**^Q
 - **Life-threatening reactions to antithyroid medications**^Q (vasculitis, agranulocytosis, or liver failure)
- A **subtotal thyroidectomy**, leaving a **4-7 gm remnant**^Q, is recommended for all remaining patients.
 - Remnants **<4 g** are associated with a **2-10% recurrence rate** but a **high (>40%) rate of hypothyroidism**^Q.

155. Ans. a. Thyrotoxicosis

156. Ans. c. Radioiodine

157. Ans. c. Remissions and exacerbations are not infrequent

HYPOTHYROIDISM

158. Ans. a. Serum TSH level (*Ref: Schwartz 9/e p1349; Sabiston 19/e p893; Bailey 26/e p743, 25/e p773; Harrison 18/e p2917*)

The **ultrasensitive TSH assay** has become the **most sensitive and specific test** for the **diagnosis of hyper- and hypothyroidism** and for **optimizing T₄ therapy**^Q.

The **enhanced sensitivity and specificity** of TSH assays have **greatly improved laboratory assessment of thyroid function**^Q.

159. Ans. a. Sheehan's syndrome (*Harrison 18/e p386*)

Sheehan's syndrome causes **hypopituitarism** leading to **decreased TSH**^Q.

POSTTHYROIDECTOMY COMPLICATIONS

160. Ans. b. Close to the gland (*Schwartz 10/e p1551-1554, 9/e p1369-1372; Sabiston 19/e p915-919; Bailey 26/e p760-761, 25/e p789-791*)

- **Both superior and inferior thyroid vessels** should be **ligated close to the thyroid**^Q.
- Superiorly, to **avoid injury** to the **external branch** of the **superior laryngeal nerve**.
- Inferiorly, to **minimize devascularization** of the **parathyroids** (extracapsular^Q dissection) or **injury to the RLN**^Q.

Thyroidectomy: Schwartz 9/e p1369-1372

- The **dissection plane** is kept as **close to the thyroid** as possible and the **superior pole vessels** are individually identified, skeletonized, ligated, and **divided low** on the **thyroid gland** to **avoid injury** to the **external branch** of the **superior laryngeal nerve**^Q
- The **inferior thyroid vessels** are dissected, skeletonized, ligated, and **divided as close to the surface of the thyroid gland** as possible to **minimize devascularization** of the **parathyroids** (extracapsular dissection) or **injury to the RLN**^Q.

Steps of Thyroidectomy

- A **Kocher transverse collar incision**, typically **4 to 5 cm** in length, is placed in or parallel to a **natural skin crease 1 cm below the cricoid cartilage**.
- The subcutaneous tissues and platysma are incised sharply and subplatysmal **flaps** are **raised superiorly** to the level of the **thyroid cartilage** and **inferiorly** to the **suprasternal notch**^Q
- The **strap muscles** are **divided in the midline** along the entire length of the mobilized flaps, and the thyroid gland is exposed.
- The **middle thyroid veins** are ligated and **divided**^Q.

- The **dissection plane** is kept as **close to the thyroid** as possible and the **superior pole vessels** are individually identified, skeletonized, ligated, and **divided low** on the **thyroid gland** to **avoid injury** to the **external branch** of the **superior laryngeal nerve**^Q

- The **RLNs** can be most consistently identified at the **level of the cricoid cartilage**.
- The **parathyroids** usually can be identified **within 1 cm** of the crossing of the **inferior thyroid artery** and the **RLN**^Q

- The inferior thyroid vessels are dissected, skeletonized, ligated, and divided as close to the surface of the thyroid gland as possible to minimize devascularization of the parathyroids (extracapsular^Q dissection) or injury to the RLN^Q.

- The RLN is most vulnerable to injury in the vicinity of the ligament of Berry. Any bleeding in this area should be controlled with gentle pressure before carefully identifying the vessel and ligating it. Use of the electrocautery should be avoided in proximity to the RLN^Q.
- Once the ligament is divided, the thyroid can be separated from the underlying trachea by sharp dissection.

- Parathyroid glands that have been inadvertently removed during the thyroidectomy should be resected, confirmed as parathyroid tissue by frozen section, divided into 1-mm fragments, and reimplanted into individual pockets in the sternocleidomastoid^Q muscle. The sites should be marked with silk sutures and a clip^Q.

161. Ans. d. Hypercalcemia (Ref: Schwartz 9/e p1372-1373; Sabiston 19/e p921; Bailey 26/e p761-762, 25/e p790-792)

Complications of Thyroidectomy

- Hemorrhage:
 - Due to slipping of ligature on the superior thyroid artery^Q, bleeding from muscular artery
 - Hematomas may cause airway compromise and must be evacuated immediately^Q.
 - Hematomas may occur immediately or later on.
 - An immediate bleed occurs after or shortly before extubation when the patient lightens from anaesthesia and may begin to cough, causing a vessel to open.
 - Delayed hemorrhage may develop slowly and therefore may not be recognized at first.
- Respiratory obstruction: Causes includes
 - Tension hematoma^Q
 - Laryngeal edema (by anesthetic intubation): MC cause of respiratory obstruction^Q
 - Bilateral recurrent laryngeal nerve paralysis^Q

Recurrent laryngeal nerve paralysis

- May be unilateral or bilateral, transient or permanent.
- Bilateral paralysis causes respiratory obstruction - Dyspnea, stridor.
- Injury to other nerves:
 - External branches of superior laryngeal nerve^Q
 - Cervical sympathetic trunk - may cause Horner's syndrome.
- Parathyroid insufficiency
 - Due to removal of the parathyroid glands or infarction due to vascular injury^Q.
 - Vascular injury^Q is more important.
 - Cases usually present 2-5 days after operation^Q with symptoms of hypocalcemia (circumoral and fingertip numbness and tingling tetany, carpopedal spasm and laryngeal stridor)^Q
 - Treatment with oral calcium and vitamin D supplements^Q
 - IV calcium gluconate^Q may be required in severe cases.
- Thyroid insufficiency
- Thyrotoxic crisis
 - Occurs if the thyrotoxic patient has been inadequately prepared for thyroidectomy.

162. Ans. c. Removing sutures from all layers in the ward and evacuation of hematoma

163. Ans. d. Apparent exophthalmos (Harrison 18/e p225, 237)

Horner's syndrome	
Clinical Features	Less Common Features
<ul style="list-style-type: none"> • Ptosis^Q • Miosis (constricted pupil)^Q • Anhydrosis^Q • Enophthalmos^Q • Loss of ciliospinal reflexes^Q 	<ul style="list-style-type: none"> • Hyperactive accommodation • Hypochromic heterochromia • Hypotony • Hyperaemia

164. Ans. b. Medial medullary syndrome (Ref: Harrison 17/e p2588)

165. Ans. d. Mydriasis

166. Ans. a. As close to the thyroid gland as possible (Ref: Schwartz 9/e p1369-1372; Sabiston 19/e p915-919)

167. Ans. c. Inferior thyroid artery is ligated away from gland; d. Capsule is kept intact (Ref: Schwartz 9/e p1369-1372)

- The inferior thyroid vessels are dissected, skeletonized, ligated, and divided as close to the surface of the thyroid gland as possible to minimize devascularization of the parathyroids (extracapsular dissection) or injury to the RLN^Q.
- Dissection is extracapsular (Capsule is removed)^Q.

168. Ans. b. 2-5 days

169. Ans. a. Hypocalcemia

170. b. Oral calcium and vitamin D (Ref: Schwartz 9/e p1373; Sabiston 19/e p921; Bailey 26/e p762, 25/e p791)

Management of Post-operative Hypocalcemia	
Transient Hypocalcemia	Prolonged or permanent Hypocalcemia
<ul style="list-style-type: none"> • Asymptomatic with calcium level >8 mg/dl: No treatment^Q • Mild symptoms or calcium level <8 mg/dl: Oral calcium^Q • Severe Symptoms: IV calcium^Q 	<ul style="list-style-type: none"> • Oral calcium with vitamin D^Q

- If hypocalcemia is expected to be prolonged or permanent (as following a 3 and 1/2 gland parathyroid resection or following total parathyroidectomy with autograft) then oral calcium should be started as soon as possible with vitamin D.

171. Ans. d. Oral calcium

172. Ans. a. IV calcium gluconate

173. Ans. d. Remove the stitch and take the patient to O.T.

174. Ans. a. Respiratory obstruction

175. Ans. a. Open immediately

176. Ans. a. Respiratory obstruction

177. Ans. a. Hypocalcemia

178. Ans. b. Open the operative site

179. Ans. d. Open the wound sutures in the ward

180. Ans. a. 0.1-0.2 mg (Ref: Harrison 18/e p2922)

- Daily replacement dose of thyroxine: 1.6 µg/Kg body weight (0.1-0.15 gm)^Q
- For TSH suppression (in PTC and FTC), dose of thyroxine: 2.7 µg/Kg body weight^Q

181. Ans. c. Hypocalcemia

- Tracheomalacia and collapse of the larynx, wound hematoma with compression of the trachea and thyroid storm are early life threatening complications of thyroidectomy^Q.
- Hypocalcemia which occurs after 2-5 days after operation and severity of causing life threatening situation is least with hypocalcemia as compared to the given options.

182. Ans. b. Recurrent laryngeal nerve

183. Ans. c. Superior thyroid artery

THYROIDITIS

184. Ans. a. Anti-TPO (Schwartz 10/e p1535, 9/e p1357; Sabiston 19/e p895; Bailey 26/e p770, 25/e p799; Harrison 18/e p2929)

Hashimoto's Thyroiditis

- First described by Hashimoto as **struma lymphomatosa**^Q i.e. a transformation of thyroid tissue to lymphoid tissue.
- MC inflammatory disorder of the thyroid and leading cause of hypothyroidism^Q.

- Thyroid lymphoma^Q is a rare but well recognized complication
- Papillary thyroid carcinoma^Q may be occasionally associated

- Genetic association has been noted with HLA B8, DR3 and DR5^Q.
- More common in women (Male: female, 1:10), near menopause (30-50 years).

Etiopathogenesis

- Autoimmune disease
- Thought to be initiated by activation of CD4+T (helper) lymphocytes which further recruit cytotoxic CD8+T cells.
- Thyroid tissue is destroyed by cytotoxic T cells and autoantibodies^Q.

Autoantibodies are directed against		
1. Thyroglobulin (Tg): 60%	2. Thyroid peroxidase (TPO): 95% ^Q	3. TSH-R: 60%

- It is also thought to be associated with:
 - Increased intake of iodine
 - Drugs such as interferon alpha, lithium, amiodarone

Pathology

- **Gross examination:** Mildly enlarged thyroid^Q with pale, gray-tan cut surface
- **Microscopic examination:**
 - Gland is **diffusely infiltrated** by **small lymphocytes** and **plasma cells**^Q and occasionally shows well-developed germinal centers.
 - **Smaller** thyroid **follicles** with **reduced colloid** and increased interstitial connective tissue.
 - Follicles are lined by **Hürthle** or **Askanazy cells**^Q (characterized by abundant eosinophilic, granular cytoplasm)

Clinical Features

- **MC presentation:** Minimally or moderately enlarged firm gland^Q.
- On examination an **enlarged pyramidal lobe** is often palpable.
- Mild hyperthyroidism may be present initially (due to destruction of thyroid tissue)
- **Hypothyroidism** is inevitable and **usually permanent**^Q.

Laboratory Findings

- **Elevated TSH** and presence of thyroid **autoantibodies** confirm the diagnosis^Q.
- **Elevated TSH, reduced T4 and T3 levels**^Q.
- Presence to thyroid autoantibodies (particularly **TPO antibody**)^Q
- In case of doubt, diagnosis is confirmed by **FNA biopsy**.

Management

- **Thyroid hormone replacement therapy** for overtly **hypothyroid** patients or in euthyroid patients to **shrink large goiters**^Q.
- Treatment is advised especially for middle-aged patients with **cardiovascular risk factors** such as hyperlipidemia or hypertension and in **pregnant patients**.
- **Surgery** may occasionally be indicated for **suspicion of malignancy** or for **goiters** causing **compressive symptoms** or cosmetic deformity.

185. Ans. b. Subacute thyroiditis (Ref: Schwartz 10/e p1535, 9/e p1356; Sabiston 19/e p895; Bailey 26/e p771, 25/e p800; Harrison 18/e p2928)

Subacute /de Quervain's/ Granulomatous/ Viral Thyroiditis/Giantcell Thyroiditis

- Also termed de Quervain's thyroiditis, granulomatous thyroiditis, or viral thyroiditis.
- Peak incidence: **30-50 years; women** are affected three times more frequently than men.
- Usually follows **upper respiratory tract infection**^Q
- A **viral etiology** has been proposed
- **Strong association** with the **HLA-B35 haplotype**^Q

The Disorder Classically Progresses Through four Stages.

1. Initial **hyperthyroid phase**, due to release of thyroid hormone
2. **Euthyroid** phase
3. **Hypothyroidism**, occurs in about 20 to 30% of patients
4. **Resolution** and return to the **euthyroid state** in >90% of patients.

- In the **early stages** of the disease, **TSH is decreased**, and **Tg, T4, and T₃ levels are elevated** due to the release of preformed thyroid hormone from destroyed follicles.
- **ESR is typically >100 mm/h**^Q.
- **RAIU also is decreased**^Q (<2% at 24 hours), even in euthyroid patients, due to the release of thyroid hormones from destruction of the thyroid parenchyma.

Clinical Features

- **Painful and enlarged thyroid**, sometimes accompanied by fever.
- Features of **thyrotoxicosis** or **hypothyroidism**, depending on the phase of the illness.
- Malaise and symptoms of an **upper respiratory tract infection** may **precede the thyroid-related features**^Q by several weeks.
- The patient typically complains of a **sore throat** and **small exquisitely tender goiter**^Q
- Pain is often referred to the jaw or ear.
- **Complete resolution** is the **usual outcome**^Q
- Permanent hypothyroidism can occur, particularly in those with coincidental thyroid autoimmunity.

Laboratory Findings

- **ESR is markedly elevated**^Q
- **Antithyroid antibodies are low** with T4, T3 and TSH levels depend on the stage of disease.

- **RAIU is decreased** during the hyperthyroid stage (distinguishes from Grave's disease)
- In doubt: **FNAC** (shows characteristic **giant multinucleated cells**)^Q

Treatment

- Treatment is **primarily symptomatic**, as disease is **self-limited**^Q.
- **Aspirin** or other NSAIDs are sufficient to control symptoms in most cases.
- **Severe cases** with marked local or systemic symptoms may require **glucocorticoids**
- **Short term thyroid replacement** may be needed in the **hypothyroid phase**.
- **Thyroidectomy** is reserved for the **rare patients** who have a prolonged course **not responsive** to medical measures.

186. Ans. a. Thyroid peroxidase antibodies 187. Ans. b. ↑ESR 188. Ans. d. Orphan Annie eye nuclei
 189. Ans. b. Hashimoto's disease 190. Ans. a. Hashimoto's thyroiditis 191. Ans. c. Hashimoto's thyroiditis
 192. Ans. c. Increased radioactive iodine uptake
 193. Ans. a. Autoimmune in etiology
 194. Ans. c. Subacute thyroiditis; d. Factitious thyroiditis (Ref: Schwartz 9/e p1353; Harrison 17/e p2229)

Differential Diagnosis of Hyperthyroidism	
Increased Hormone Synthesis (Increased RAIU)	Release of Preformed Hormone (Decreased RAIU)
<ul style="list-style-type: none"> • Grave's disease^Q (diffuse toxic goiter) • Toxic multinodular goiter^Q • Plummer's disease^Q (toxic adenoma) • Drug induced: amiodarone, iodine • Thyroid cancer • Struma ovarii • Hydatidiform mole 	<ul style="list-style-type: none"> • Thyroiditis: Acute phase of Hashimoto's thyroiditis, subacute thyroiditis^Q • Factitious (iatrogenic) Thyrotoxicosis • "Hamburger thyrotoxicosis"

195. Ans. c. In the thyrotoxic phase radioiodine uptake is increased 196. Ans. b. Hashimoto's thyroiditis
 197. Ans. d. Reidel's thyroiditis (Ref: Schwartz 10/e p1536, 9/e p1357; Sabiston 19/e p896; Bailey 26/e p771, 25/e p800)

Riedel's Thyroiditis

- A rare variant of thyroiditis also known as **Riedel's struma**^Q or **invasive fibrous thyroiditis**
- Characterized by the **replacement** of all or part of the **thyroid parenchyma** by **fibrous tissue**
- Also **invades** into **adjacent tissues**^Q.
- **Etiology:** Primary **autoimmune etiology** (probably)

Riedel's Thyroiditis is Associated With		
• Mediastinal and retroperitoneal fibrosis	• Periorbital and retro-orbital fibrosis	• Sclerosing cholangitis

Clinical Features

- Occurs predominantly in **women, 30-60 years**.
- Presents as a **painless, hard anterior neck mass**^Q, which progresses over weeks to years to produce **symptoms** of **compression**, including dysphagia, dyspnea, choking, and hoarseness.
- Patients may present with symptoms of **hypothyroidism** and **hypoparathyroidism**^Q as the **gland is replaced** by **fibrous tissue**.
- Physical examination: **Hard, "woody" thyroid gland** with **fixation**^Q to surrounding tissues.

Diagnosis

- Diagnosis is confirmed by **open thyroid biopsy**^Q, because the firm and fibrous nature of the gland renders FNAC **inadequate**.

Treatment

- **Surgery**^Q is the **mainstay** of the treatment (decompress the trachea by wedge excision of the thyroid isthmus)
- Some patients show dramatic improvement with **tamoxifen** and **corticosteroids**.

198. Ans. c. Riedel's thyroiditis 199. Ans. c. Subacute thyroiditis (Ref: Schwartz 10/e p1535, 9/e p1356; Sabiston 19/e p895)

Diagnosis in this case is subacute thyroiditis. Symptoms are more severe in acute thyroiditis with complications and acute thyroiditis is more common in children.

Just take a look of acute thyroiditis.

Acute (Suppurative) Thyroiditis

- Acute thyroiditis is rare and due to **suppurative infection** of the **thyroid**^Q.
- **More common in children** and often is **preceded** by an **upper respiratory tract infection** or **otitis media**^Q.

Etiology

- The thyroid gland is inherently resistant to infection due to its extensive blood and lymphatic supply, high iodide content, and fibrous capsule.

Infectious Agents can Seed Thyroid

1. Via **hematogenous** or **lymphatic route**^Q
2. Via direct **spread** from **persistent pyriform sinus fistulae** or **thyroglossal duct cysts**^Q
3. As a result of **penetrating trauma**^Q
4. Due to **immunosuppression**^Q

- **Streptococcus** and **anaerobes**^Q account for about **70%** of cases.
- In **children** and **young adults**, **MC cause** is presence of a **pyriform sinus**^Q (remnant of the fourth **branchial pouch** that connects the oropharynx with thyroid), such sinuses are predominantly **left-sided**^Q.
- **Long-standing goiter** and **degeneration** in **thyroid malignancy** are risk factors in **elderly**^Q.

Clinical Features

- **Thyroid pain**, often referred to the throat or ears, and a **small, tender goiter**^Q
- **Fever, dysphagia** and **erythema** over the thyroid
- Systemic symptoms of a **febrile illness** and **lymphadenopathy**^Q.
- Complications such as systemic sepsis, tracheal or esophageal rupture, jugular vein thrombosis, laryngeal chondritis, and perichondritis or sympathetic trunk paralysis may also occur.

Diagnosis

- **ESR** and **WBC count** are usually **increased**, but **thyroid function** is **normal**.
- **FNA biopsy** shows infiltration by **polymorphonuclear leukocytes**
- **Culture** of the sample can identify the organism.
- **Persistent pyriform sinus fistula** should be suspected in **children** with recurrent acute thyroiditis. A **barium swallow** demonstrates the anomalous tract with **80% sensitivity**^Q.

Treatment

- **Parenteral antibiotics** and **drainage of abscesses**^Q.
- Patients with **pyriform sinus fistulae** require **complete resection**^Q of the sinus tract, including the area of the thyroid where the tract terminates, **to prevent recurrence**.

200. Ans. c. Thyroglobulins
201. Ans. c. To overcome pressure on trachea or esophagus
202. Ans. b. Antithyroid nuclear antibodies
203. Ans. a. Subacute lymphocytic thyroiditis
204. Ans. c. Hashimotos thyroiditis
205. Ans. d. Reidel's thyroiditis
206. Ans. c. Giant cell infiltration

Painless or Silent Thyroiditis

- Painless thyroiditis, or "silent" thyroiditis, occurs in patients with **underlying autoimmune thyroid disease** and has a **clinical course similar to that of subacute thyroiditis**.
- Occurs in up to **5% of women 3–6 months after pregnancy** and is then termed **postpartum thyroiditis**.
- **Associated with presence of TPO antibodies antepartum**, three times **more common** in women with type 1 DM.

Clinical Features:

- Typically, patients have a **brief phase of thyrotoxicosis lasting 2–4 weeks**, followed by **hypothyroidism for 4–12 weeks**, and **then resolution**; often, however, only one phase is apparent.

Diagnosis:

- As in subacute thyroiditis, the **uptake of ^{99m}Tc pertechnetate or radioactive iodine** is initially suppressed.
- In addition to the **painless goiter**, silent thyroiditis can be **distinguished from subacute thyroiditis by a normal ESR & presence of TPO antibodies**.

Treatment:

- Glucocorticoid treatment is not indicated for silent thyroiditis.
- **Severe thyrotoxic symptoms**: Propranolol
- **Thyroxine replacement** for hypothyroid phase but **should be withdrawn after 6–9 months**, as **recovery is the rule**.

Prognosis:

- **Annual follow-up** thereafter is recommended, because a proportion of these individuals develop permanent hypothyroidism.
- The condition **may recur in subsequent pregnancies**.

THYROGLOSSAL CYST AND FISTULA

207. Ans. d. Thyroglossal cyst/fistula (Ref: Schwartz 10/e p1521, 9/e p1344; Sabiston 19/e p813-814)

Thyroglossal cyst

- It is **cystic swelling** developed in the remnant of the **thyroglossal duct** or **tract**
- It may be **present in any part** of the **thyroglossal tract**^Q (thyroglossal tract extends from foramen caecum to the isthmus of thyroid)

Common sites

- Subhyoid (MC)**^Q
 - In the region of the thyroid cartilages
- Suprahyoid**
 - In the floor of mouth
- Beneath the foramen caecum

Clinical Features

- It is a **midline swelling**^Q, except in the region of the thyroid cartilage, where the thyroglossal tract is pushed to one side, usually to the left.
- Though it's a **congenital swelling**^Q most common **age of presentation** is between **15-30 years**^Q.
- Cyst can be **moved sideways** but not vertically.
- Peculiar characteristic which helps in distinguishing thyroglossal cyst from other neck swelling
 - Moves up with protrusion of tongue**^Q as the thyroglossal tract is attached to the tongue.
 - Moves with deglutition**^Q so do all thyroid swellings, subhyoid bursitis.
- Cyst is lined by pseudostratified columnar epithelium and squamous epithelium with **heterotopic thyroid tissue** present in **20%** of cases.

Complications

- Recurrent infections**^Q
 - Formation of **thyroglossal fistula**^Q
 - Carcinomatous change, usually **papillary carcinoma**^Q

Treatment

- Sistrunk operation**: En-bloc cystectomy and excision of the **central hyoid bone**^Q to minimize recurrence.

208. Ans. a. Does not move with deglutition 209. Ans. c. Thyroglossal cyst 210. Ans. c. Subhyoid

211. Ans. c. Incision and drainage is the treatment of choice

212. Ans. a. Papillary

213. Ans. c. Excision of central part of hyoid bone and cone of tongue muscles upto foramen caecum

214. Ans. a. Surgical removal

THYROID ANATOMY AND PHYSIOLOGY

215. Ans. a. Jod-Basedow effect (Ref: Schwartz 10/e p1526, 9/e p1348; Sabiston 19/e p892; Harrison 17/e p2241)

• Wolff-Chaikoff effect	• Iodine induced hypothyroidism ^Q • (Iodine dependent transient thyroid suppression)
• Jod-Basedow's effect	• Iodine induced hyperthyroidism ^Q

216. Ans. b. 0.04 mIU/L (The thyroid: a Fundamental and Clinical Text (Lippincott Williams) 2008/329-330)

The lower functional limit for third generation TSH assays is about 0.01 to 0.02 mIU/L.

217. Ans. b. Inferior thyroid artery

218. Ans. b. Inversely

219. Ans. c. 18-20 gm

220. Ans. a. Nephrotic syndrome

- In Nephrotic syndrome, iodine binding proteins are decreased.

221. Ans. c. 2nd and 3rd and 4th tracheal cartilage (Ref: Schwartz 10/e p1523, 9/e p1345; Sabiston 19/e p887; Gray's 39/e p560-564)

Isthmus that is located just inferior to the cricoid cartilage, usually anterior to the 2nd and 3rd tracheal cartilages.

Thyroid Gland

- Normal weight** of thyroid gland: **20-25 gms**^Q
- Daily iodine requirement**: **100-150 µg**^Q
- Father of thyroid surgery: **Theodor Kocher**^Q
- Gland weight varies **inversely with iodine intake**^Q.
- Isthmus** that is **located just inferior** to the **cricoid cartilage**, usually anterior to the **2nd and 3rd (mainly)** and **4th tracheal rings**^Q.
- A **pyramidal lobe** is present in about **50%** of patients.
- The **thyroid capsule** is **condensed into the posterior suspensory** or **Berry's ligament**^Q near the cricoid cartilage and upper tracheal rings.
- The **thyroid gland** has a **thin capsule** of connective tissue, which extends into the glandular parenchyma and divides each lobe into irregularly shaped and sized lobules.
- The **external laryngeal nerve** runs close to the **superior thyroid artery** and the **recurrent laryngeal nerve** runs close to the **inferior thyroid artery**^Q.

MISCELLANEOUS

222. Ans. d. All the above (www.medixon.com)

Scabard (Saber-Sheath) Trachea

- **Flattening** of trachea caused by **lateral compression**^Q by swellings or tumors
- Causes: **Carcinoma thyroid, thyroiditis, carcinoma larynx, goitre**^Q

223. Ans. b. Tracheostomy ([Ref: Nelson 17/e p1881](#))

Partial thyroidectomy is preferred over tracheostomy.

224. Ans. a. I-131

225. Ans. a. Radioiodine is contraindicated

226. Ans. b. Chromosome 7q ([Ref: Harrison 18/e p252, 2913; Schwartz 9/e p1349](#))

Pendred's Syndrome

- Consists of **congenital sensorineural hearing loss + goitre**^Q
- Due to defect in sulfate transport protein (chromosome 7q^Q) to the thyroid gland and cochlea

Rafetoff Syndrome

End organ resistance to T4^Q

227. Ans. a. Lingual thyroid ([Ref: Schwartz 10/e p1522, 9/e p1345](#))

Reddish swelling in the region of foramen caecum is Lingual thyroid.

Lingual Thyroid

- Forms a **rounded swelling** at the **back of tongue** at the **foramen caecum**^Q
- It may represent the **only thyroid tissue present**^Q
- May cause dysphasia, impairment of speech, respiratory obstruction or hemorrhage
- **Medical treatment** options include administration of **exogenous thyroid hormone** to **suppress TSH** and **RAI ablation** followed by **hormone replacement**.
- **Surgical excision** is **rarely needed** but, if required, should be preceded by an evaluation of normal thyroid tissue in the neck to avoid inadvertently rendering the patient hypothyroid.

228. Ans. d. Benign lesion; e. Included in Teratoma ([Ref: Shaws Gynecology 14/e p336-337](#))

Struma Ovarii

- Highly specialized variety of **teratoma**
- A **benign ovarian tumor** containing **thyroid tissue**^Q
- The tumor is solid and consisting entirely of thyroid tissue
- Some cases develop **thyrotoxicosis**^Q
- Most of the tumor is **innocent**, but malignant transformation have been recorded

229. Ans. c. Di-George syndrome

Di-George Syndrome

Characterized by

- **Congenital cardiac defects**, particularly those involving great vessels^Q
- Hypocalcemic tetany due to **failure of parathyroid development**^Q
- **Absence of normal thymus**, T-cell immunodeficiency^Q

Parathyroid and Adrenal Glands

MULTIPLE CHOICE QUESTIONS

MULTIPLE ENDOCRINE NEOPLASIA

1. A 20-years old male presents with chronic constipation, headache and habitus, neuromas of tongue, medullated corneal nerve fibers and nodule of 2X2 cm size in left lobe of thyroid. This patient is a case of: *(All India 2004)*
 - a. Sporadic medullary carcinoma of thyroid
 - b. Familial medullary carcinoma of thyroid
 - c. MEN-2A
 - d. MEN-2B
2. MEN-2A includes all except: *(PGI June 2004)*
 - a. Ganglioneuromas
 - b. Cutaneous Lichen amyloidosis
 - c. Mutation in RET in chromosome 10
 - d. Adrenal adenoma
3. True about MEN-1: *(PGI June 2004)*
 - a. ↑ VMA in urine
 - b. ↑ Calcitonin
 - c. Hypergastrinemia
 - d. Hyperprolactinemia
 - e. Hypocalcemia
4. The most common organ involved in MEN-1 is: *(COMEDK 2010)*
 - a. Parathyroid
 - b. Thyroid
 - c. Adrenal
 - d. Testis
5. True about MEN-2A (Sipple syndrome): *(PGI Dec 2006)*
 - a. Pheochromocytoma
 - b. Hyperparathyroidism
 - c. Mucocutaneous neuromas
 - d. Medullary carcinoma of thyroid
6. Intestinal obstruction with jejunal neuromas are found in: *(MHSSMCET 2006)*
 - a. MEN-1
 - b. MEN-2A
 - c. MEN-2B
 - d. Familial intestinal polyposis
7. An infant is diagnosed with MEN-2B trait. Which the following will be best line of management? *(MHSSMCET 2007)*
 - a. Prophylactic surgery
 - b. Clinical observation and follow up
 - c. Regular FNAC
 - d. All of the above
8. Common feature to MEN1 and MEN2? *(MHSSMCET 2010, 2006)*
 - a. Hyperparathyroidism
 - b. Medullary carcinoma of thyroid
 - c. Pheochromocytoma
 - d. Carcinoids

PARATHYROID GLAND

9. Primary hyperparathyroidism is caused by: *(PGI June 2002)*
 - a. Parathyroid hyperplasia
 - b. Adenosis
 - c. MEN-1
 - d. Thyrotoxicosis
 - e. CRF
10. Treatment for parathyroid hyperplasia is: *(UPSC 2001)*
 - a. Removal of all four glands
 - b. Calcitonin
 - c. Removal of 3½ glands
 - d. Enlarged glands to be removed
11. Parathyroid adenoma most commonly involves which of the following site: *(AIIMS June 2002)*
 - a. Thyroid substance
 - b. Superior parathyroid lobe
 - c. Inferior parathyroid lobe
 - d. In the mediastinum
12. Features to differentiate parathyroid adenoma from hyperplasia would include which of the following? *(AIIMS June 2002)*
 - a. Presence of excess chief cells
 - b. High levels of parathormone
 - c. Infiltration of capsule
 - d. Identifying hyperplasia of all 4 glands at surgery in parathyroid hyperplasia
13. True about parathyroid carcinoma:
 - a. Parathyroid gland is palpable
 - b. High calcium level
 - c. Cinacalcet is used
 - d. All of the above
14. In case of parathyroid adenoma, treatment is: *(AIIMS Nov 95)*
 - a. Calcitonin and steroid
 - b. Removal of adenoma
 - c. Total parathyroidectomy and implantation in arm
 - d. Total parathyroidectomy
15. Kamli Rani, 75-years old woman present with post myocardial infarction after 6 weeks mild CHF. There was past H/O neck surgery for parathyroid adenoma 5 years ago, ECG shows slow atrial fibrillation. Serum Ca^{2+} 13.0 mg/L and urinary Ca^{2+} is 300 mg/24 hr. On examination there is small mass in the Para tracheal position behind the right clavicle. Appropriate management at this time is: *(All India 2002)*
 - a. Repeat neck surgery
 - b. Treatment with technetium-99
 - c. Observation and repeat serum Ca^{2+} in two months
 - d. Ultrasound-guided alcohol injection of the mass

16. **Commonest cause for hyperparathyroidism is:** (MHCET 2016, All India 89)
 a. Single adenoma
 b. Multiple adenomas
 c. Single gland hyperplasia
 d. Multiple gland Hyperplasia
17. **Most common cause of hypercalcemic crisis is:** (AIIMS 87)
 a. Parathyroid adenoma
 b. Parathyroid hyperplasia
 c. Carcinoma breast
 d. Paget's disease
18. **Hyperparathyroidism occurs as a result of:** (TN 91)
 a. Idiopathic atrophy of parathyroids
 b. Following surgery
 c. Thyroiditis with secondary atrophy of parathyroids
 d. All of the above
19. **Hypocalcemia in immediate post-op period following excision of parathyroid adenoma is due to:** (AIIMS 92)
 a. Stress
 b. Increased uptake by bones
 c. Hypercalciuria
 d. Increased calcitonin
20. **In parathyroid crisis with sudden elevations of calcium over 16 mg/dl; the treatment consist of:** (AIIMS 80, UPSC 84)
 a. Intravenous vitamin D
 b. Parathyroidectomy for removal of adenoma
 c. Thyrocalcitonin
 d. Intravenous bicarbonate
 e. All of the above
21. **Hyperparathyroidism is characterized by the following except:** (PGI 80, AMU 88)
 a. Generalized osteoporosis
 b. Renal calculi
 c. Hypercalcemia
 d. Osteosclerosis
22. **A patient has hypocalcaemia which was the result of a surgical complication. Which operation could it possibly have been?** (JIPMER 89, UPSC 86)
 a. Nephrectomy
 b. Thyroidectomy
 c. Gastrectomy
 d. Vocal cord tumour biopsy
23. **The symptoms of hyperparathyroidism include:**
 a. Constipation and muscle weakness (AIIMS 81, PGI 85)
 b. Anorexia and weight loss
 c. Polydipsia and polyuria
 d. All of the above
24. **A known patient with renal stone disease developed pathological fractures along with abdominal pain and certain psychiatric symptoms. He should be investigated for:**
 a. Polycystic kidney
 b. Renal tubular acidosis
 c. Hyperparathyroidism
 d. Paget's disease of bone
25. **Hypocalcemia is a feature of all of the following except:** (UPSC 2000)
 a. Chronic renal failure
 b. Hypoparathyroidism
 c. Pseudo hypoparathyroidism
 d. Total thyroidectomy
26. **Which of the following is true about secondary hyperparathyroidism?**
 a. Commonly occurs in CRF
 b. Related to hyperphosphatemia
 c. Patients are generally hypocalcemic
 d. All of the above
27. **Which of the following is true about parathyroid?**
 a. Post parathyroid glands are within junction of inferior thyroid artery and RLN

- b. Most common location of ectopic parathyroid glands is paraesophageal
 c. Lower parathyroid is anterior to RLN
 d. All of the above

ADRENAL GLANDS

28. **During bilateral adrenalectomy, intra-operative dose of hydrocortisone should be given after:** (AIIMS Nov 2004)
 a. Opening the abdomen
 b. Ligation of left adrenal vein
 c. Ligation of right adrenal vein
 d. Excision of both adrenal glands
29. **A 35-years old woman has had recurrent episodes of headache and sweating. Her mother had renal calculi and died of thyroid cancer. Physical observations revealed a thyroid nodule and ipsilateral enlarged cervical lymph nodes. Before performing thyroid surgery the woman's physician should order:** (All India 2002)
 a. Thyroid scan
 b. Estimation of hydroxyl indole acetic acid in urine
 c. Estimation of urinary metanephrines, VMA and catecholamines
 d. Estimation of TSH, and TRH levels in serum
30. **Young female presents with hypertension with VMA >14 mg/day, associated with:** (PGI Dec 2002)
 a. Medullary carcinoma thyroid
 b. Von-Hippel Lindau disease
 c. Sturge-Weber syndrome
 d. Grave's disease
 e. Neurofibromatosis
31. **Palpation on the costovertebral angle produces pain and tenderness in acute adrenal insufficiency. This is:** (AIIMS 87, 89)
 a. Rotch's sign
 b. Rossolimo's sign
 c. Rogoff's sign
 d. Osler's sign
32. **Commonest cause of Cushing syndrome is:** (Kerala 95)
 a. Adrenal adenoma
 b. Carcinoma
 c. Hyperplasia
 d. Atrophy
33. **Most common cause of Addison's disease in India:** (AIIMS Nov 2011)
 a. Tuberculosis
 b. Post-partum
 c. Autoimmune
 d. HIV
34. **Indication for surgery in a case of adrenal incidentaloma:** (MAHE 2008, 2007)
 a. Size >5 cm
 b. Bilateral adrenal metastasis
 c. Functional tumor
 d. All of the above
35. **Incidental finding in CT scan, a 3 cm adrenal mass, which of the following is not done?** (UPPG 2008)
 a. Adrenalectomy
 b. Dexamethasone suppression test
 c. Measurement of catecholamines
 d. Midnight plasma cortisol
36. **Accidental finding of incidentaloma (Adrenal mass) on USG is detected. Following is/are to be ruled out:** (PGI Dec 2006)
 a. Cushing's disease
 b. Metastasis
 c. Adrenal adenoma
 d. Carcinoma
 e. Adrenal hyperplasia

37. **True about adrenocortical carcinoma:**
 a. Rare tumor
 b. More than half are functional
 c. Most commonly associated with Cushing syndrome
 d. All of the above
38. **A 50 years old male presents with severe refractory hypertension, weakness, muscle cramps and hypokalemia, the most likely diagnosis is:** (COMEDK 2011)
 a. Hypoaldosteronism
 b. Hyperaldosteronism
 c. Cushing syndrome
 d. Pheochromocytoma
39. **Which one of the following is not a CT feature of adrenal adenoma?** (AIIMS Nov 2010)
 a. Low attenuation
 b. Homogeneous density and well defined borders
 c. Enhances rapidly, contrast stays in it for relatively longer time and washes out late
 d. Calcification is rare
40. **After bilateral adrenalectomy, patient developed gradual loss of vision, with hyperpigmentation of skin, and headache. Likely cause is:** (MHSSMCET 2006)
 a. Addison's disease
 b. Nelson syndrome
 c. Cushing's disease
 d. Hypopituitarism
41. **Nonfunctional adrenal tumors are operated at what size:** (MHSSMCET 2009)
 a. >3cm
 b. >5cm
 c. >6cm
 d. >10cm
42. **In renal agenesis, the adrenal gland is:** (MHSSMCET 2006)
 a. Absent
 b. Present on contralateral side
 c. Ectopic in the iliac fossa
 d. Present at the usual location
43. **Most prevalent incidentcoma is:** (MHCET 2016)
 a. Cushing's adenoma
 b. Pheochromocytoma
 c. Adrenocortical carcinoma
 d. Non-functioning adenoma
44. **Which one of the following clinical features is not seen in pheochromocytoma?** (COMEDK 2011)
 a. Hypertension
 b. Episodic palpitations
 c. Weight loss
 d. Diarrhea
45. **Episodic hypertension is a feature of:** (JIPMER 2010)
 a. Carcinoid tumor
 b. Insulinoma
 c. Pheochromocytoma
 d. Zollinger-Ellison syndrome
46. **The investigation of choice for extra adrenal pheochromocytoma:** (PGI Dec 2007)
 a. MIBG scan
 b. MRI
 c. CT
 d. X-ray
 e. USG
47. **All are true about pheochromocytoma except:** (All India 2011)
 a. 90% are malignant
 b. 95% occur in the abdomen
 c. They secrete catecholamines
 d. They arise from sympathetic ganglions
48. **Investigation useful for detecting extra-adrenal pheochromocytoma:** (PGI May 2011)
 a. USG
 b. CT
 c. T2-weighted MRI with gadolinium contrast
 d. MIBG
49. **True about pheochromocytoma is:** (MHSSMCET 2002)
 a. Arises from chromaffin cells of adrenal medulla
 b. Bilateral in 20% of all cases
 c. Hypotension rules out pheochromocytoma
 d. Almost always a malignant tumor
50. **Pheochromocytoma with malignant potential exclusively secretes:** (MHSSMCET 2008)
 a. Dopamine
 b. Epinephrine
 c. Metanephrine
 d. Norepinephrine
51. **False regarding pheochromocytoma:**
 a. 10% of nonfamilial adrenal pheochromocytomas are bilateral (MHSSMCET 2006)
 b. Only 10% of hypertensive patients have an underlying pheochromocytoma
 c. 10% of adrenal pheochromocytomas arise in childhood
 d. FNAC is must for diagnosis
52. **Commonest symptom of pheochromocytoma is:** (UPSC 88)
 a. Palpitation
 b. Headache
 c. Sweating
 d. Dyspnea
53. **In pheochromocytoma, the urine will contain:** (UPPG 96)
 a. VMA
 b. HIAA
 c. Both
 d. None
54. **False statement about pheochromocytoma:** (All India 97)
 a. 10% are bilateral
 b. Arises from chromaffin cells
 c. Extra adrenal tumor - increased nor adrenaline levels
 d. Increased VMA levels in urine
55. **Radionuclide used in pheochromocytoma is:** (COMEDK 2005)
 a. Radioactive iodine I-131
 b. Technitium pertechnetate
 c. Radiolabelled chromium
 d. ^{123}I Metaiodobenzylguanidine (MIBG)
56. **The most common site of ectopic pheochromocytoma is:** (COMEDK 2008)
 a. Organ of Zuckerkandl
 b. Bladder
 c. Filum terminale
 d. Celiac plexus
57. **A patient presented with headache and flushing. He has a family history of his relative having died of a thyroid tumour. The investigation that would be required for this patient would be:** (AIIMS June 99)
 a. Chest X-ray
 b. Measurement of 5 HIAA
 c. Measurement of catecholamine
 d. Intravenous pyelography
58. **Investigation of choice in case of a patient with episodic hypertension, headache and thyroid nodule:** (AIIMS Nov 97)
 a. Urinary HIAA
 b. Urinary catecholamine and aspiration of nodule
 c. Thyroid function test only
 d. Urinary basic amino acid metabolite

PHEOCHROMOCYTOMA

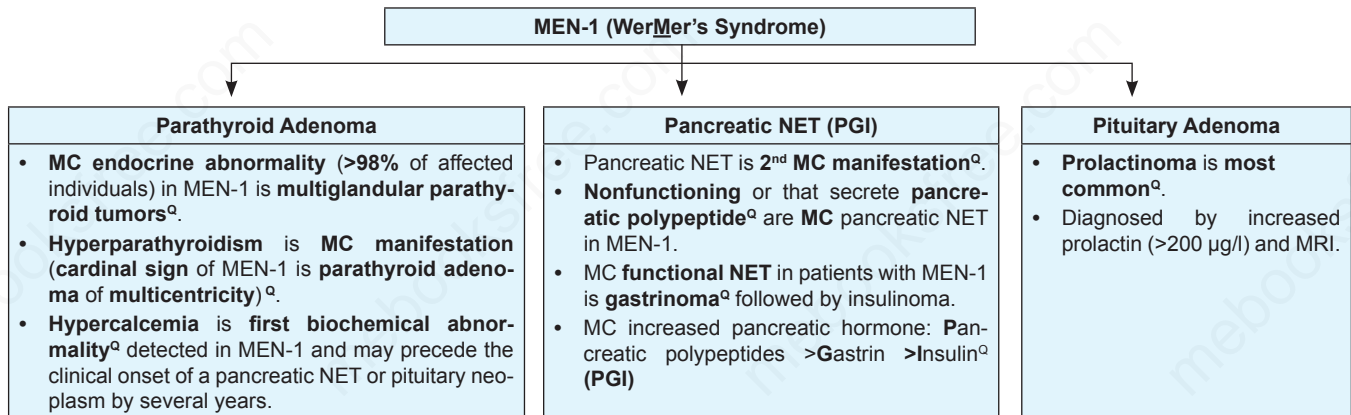
NEUROBLASTOMA

59. **Neuroblastomas: Good prognostic factor is:** (PGI June 2000)
 a. N-myc amplification b. RAS oncogene
 c. Hyperdiploidy d. Translocations
60. **Opsoclonus-Myoclonus is a phenomenon seen in:** (PGI 97)
 a. Wilm's tumor b. Neuroblastoma
 c. Meningioma d. Cortical tuberculoma
61. **Not seen in neuroblastoma is:** (UPPG 96)
 a. Diarrhea
 b. Proptosis
 c. Splenomegaly
 d. Bone involvement
62. **True about neuroblastoma:** (PGI Dec 2006)
 a. Seen in adrenal glands
 b. ↑ VMA/HVA
 c. Lymphatic metastasis more common than blood metastasis
 d. Presents with abdominal mass
63. **Which of the following statements about neuro-blastoma is not true?** (All India 2009)
 a. Most common extra cranial solid tumor in childhood
 b. >50% present with metastasis at time of diagnosis
 c. Lung metastasis are common
 d. Often encase aorta and its branches at time diagnosis
64. **Mrs. Neena noted an abdominal mass in left side of her 6 months old child, which showed calcification near the left kidney. What will be the cause?** (AIIMS Nov 2000)
 a. Leukemia b. Neuroblastoma
 c. RCC d. Lymphoma
65. **Tumor arising from olfactory nasal mucosa is:** (All India 2012)
 a. Nasal glioma
 b. Adenoid cystic carcinoma
 c. Nasopharyngeal carcinoma
 d. Esthesio-neuroblastoma

EXPLANATIONS

MULTIPLE ENDOCRINE NEOPLASIA

1. Ans. d. MEN-2B: (Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 26/e p795-797, 25/e p824-826; Harrison 18/e p3072, 3075)



	MEN-2A (Sipple syndrome)	MEN-2B
Components	<ul style="list-style-type: none"> Medullary carcinoma thyroid^Q Pheochromocytoma^Q Parathyroid hyperplasia or adenoma^Q Hirschprung's disease^Q Cutaneous lichen amyloidosis^Q 	<ul style="list-style-type: none"> Medullary carcinoma thyroid^Q Pheochromocytoma^Q Intestinal ganglioneuromas^Q Mucosal neuromas^Q Megacolon^Q Marfanoid features^Q
Defect	<ul style="list-style-type: none"> RET oncogene (cysteine^Q codon) Chromosome: 10^Q 	<ul style="list-style-type: none"> RET oncogene (tyrosine kinase^Q domain) Chromosome: 10^Q
Transmission	Autosomal dominant ^Q	Autosomal dominant ^Q

2. Ans. a. Ganglioneuromas
3. Ans. a. ↑ VMA in urine, c. Hypergastrinemia, d. Hyperprolactinemia (Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 26/e p795-797, 25/e p824-825; Harrison 18/e p3072)

MEN-1 (WERMER'S SYNDROME)

- Autosomal dominant^Q
- Defect: MEN1 gene^Q on chromosome 11^Q (encodes tumour suppressor protein, **menin**^Q)

Characteristic Features

Common Manifestations	Less Common Manifestation
<ul style="list-style-type: none"> Parathyroid hyperplasia or adenoma^Q Pancreatic NET^Q Pituitary adenoma^Q 	<ul style="list-style-type: none"> Bronchial and thymic carcinoids^Q Adrenocortical tumors Subcutaneous or visceral lipomas^Q Facial cutaneous angiofibromas^Q Collagenomas^Q

Parathyroid Gland

- MC endocrine abnormality (>98% of affected individuals) in MEN-1 is **multiglandular parathyroid tumors**^Q.
- Hyperparathyroidism** is MC manifestation (cardinal sign of MEN-1 is **parathyroid adenoma of multicentricity**)^Q.
- Parathyroid hyperplasia** is the MC cause of **hyperparathyroidism** in MEN-1.
- Hypercalcemia** is **first biochemical abnormality**^Q detected in MEN 1 and may precede the clinical onset of a pancreatic NET or pituitary neoplasm by several years.

Pancreatic Neuro-Endocrine Tumors

- Pancreatic NET is 2nd MC manifestation^Q.
- **Nonfunctioning** or that secrete **pancreatic polypeptide** are MC pancreatic NET in MEN-1^Q.
- MC **functional NET** in patients with MEN-1 is **gastrinoma**^Q followed by insulinoma.
- MC increased pancreatic hormone: Pancreatic polypeptides > Gastrin > Insulin^Q. (PGI)

Pituitary Adenoma

- In pituitary, **prolactinoma** is **most common**^Q.
- Diagnosed by increased prolactin (>200 ug/l) and MRI.

Principal Cause of Mortality in MEN-1

- Malignant progression of duodenopancreatic neuroendocrine cancers, or intrathoracic malignant carcinoids^Q.
- Werner's Syndrome: Adult progeroid syndrome + Carcinoma thyroid^Q

4. Ans. a. Parathyroid (Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 25/e p824-825; Harrison 18/e p3072)

5. Ans. a. Pheochromocytoma, b. Hyperparathyroidism, d. Medullary carcinoma of thyroid

6. Ans. c. MEN-2B

7. Ans. a. Prophylactic surgery (Ref: Schwartz 9/e p1368; Sabiston 19/e p913)

Prophylactic Thyroidectomy in RET Mutation Carriers	
MEN-2A	Before 5 years ^Q
MEN-2B	Before 1 year ^Q

8. Ans. a. Hyperparathyroidism

PARATHYROID GLAND

9. Ans. a. Parathyroid hyperplasia, b. Adenosis, c. MEN-1 (Ref: Schwartz 10/e p1559-1563, 9/e p1377-1380; Sabiston 19/e p928-932; Bailey 26/e p771-774, 25/e p800-804; Harrison 18/e p3100-3105)

PRIMARY HYPERPARATHYROIDISM

- PHPT arises from **increased PTH production**^Q from abnormal parathyroid glands and results from a disturbance of normal feedback control exerted by serum calcium.
- More common in **women**^Q

- Solitary adenoma^Q is the MC cause (in 80%)
- Parathyroid adenomas are **most commonly located** in **inferior** parathyroid glands.

- Increased PTH production leads to **hypercalcemia** via:
 - Increased GI absorption of calcium
 - Increased production of vitamin D3
 - Reduced renal calcium clearance

Etiology

- Exposure to **low-dose therapeutic ionizing radiation** and **familial predisposition**^Q
- Renal leak of calcium
- **Declining renal function** with age
- **Alteration in the sensitivity** of parathyroid glands to suppression by calcium
- **Lithium** therapy

Genetics

- **Most cases** of PHPT are **sporadic**
- Also associated with **MEN1**, **MEN2A**, isolated familial HPT, and familial HPT with jaw-tumor syndrome.

Clinical Features

- Patients with PHPT formerly presented with the "**classic**" **pentad** of symptoms:
 - **Kidney stones**^Q
 - **Painful bones**^Q
 - **Abdominal groans**^Q
 - **Psychic moans**^Q
 - **Fatigue overtones**^Q

- Alteration in the “typical” patient with PHPT due to widespread use of automated blood analyzers.
- Patients are more likely to be minimally symptomatic or asymptomatic.
- Currently, **most patients** present with **weakness**, fatigue, **polydipsia**, **polyuria**, **nocturia**, **bone and joint pain**, **constipation**^Q, decreased appetite, nausea, heartburn, pruritus, depression, and memory loss.
- Renal **calculi** are typically composed of **calcium phosphate** or **oxalate**^Q.

Osteitis fibrosa cystica in advanced PHPT
Pathognomonic radiologic findings on x-rays of hands, characterized by: <ul style="list-style-type: none"> • Subperiosteal resorption^Q (most apparent on the radial aspect^Q of middle phalanx^Q of 2nd and 3rd fingers) • Bone cysts^Q • Tufting of distal phalanges^Q

Diagnosis

- **Elevated serum calcium** and intact **PTH** or two-site **PTH** levels, **without hypocalciuria** establishes the **diagnosis of PHPT** with virtual certainty^Q.
- **Decreased serum phosphate** (50%) and **elevated 24-hour urinary calcium** (60%) in PHPT^Q

Localization

- ^{99m}Tc-labeled sestamibi: **Most widely used and accurate modality**^Q (sensitivity >80% for detection of parathyroid adenomas)

Treatment

- **Parathyroidectomy** for patients having “classic” symptoms of PHPT or <50 years^Q
- **SERM** and **bisphosphonates** are used to **lower serum calcium** and **increase BMD** in PHPT.

Indications for Parathyroidectomy in Asymptomatic Primary HPT	
1. Serum calcium >1 mg/dL above the upper limits of normal	6. Substantially decreased bone mineral density at the lumbar spine, hip, or distal radius
2. Life-threatening hypercalcemic episode	7. Age <50 years
3. Creatine clearance reduced by 30%	8. Long-term medical surveillance not desired or possible
4. Kidney stones on abdominal x-rays	
5. Markedly elevated 24-h urinary calcium excretion (≥400 mg/d)	

10. Ans. c. Removal of 3½ glands (Ref: Harrison 18/e p3103-3105; Schwartz 10/e p156, 9/e p1384; Sabiston 19/e p936)

TREATMENT OF PRIMARY HYPERPARATHYROIDISM

- Initial correction of hypercalcemia (Rapid IV NaCl with furosemide)^Q
- Neck exploration is done and treatment is done accordingly

A single parathyroid adenoma (85%) ^Q	• Resection ^Q
Two adenomas (5%)	• Resection ^Q
Hyperplasia of all four glands (10-15%)	• Resection of 3½ glands ^Q • Resection of all four glands with autotransplantation of a parathyroid gland in the forearm (brachioradialis) or SCM muscle ^Q

PARATHYROID AUTOTRANSPLANTATION

- Whenever **multiple parathyroids** are resected, it is preferable to **cryopreserve tissue**, so that it may be autotransplanted should the patient become hypoparathyroid^Q.
- Approx. **12-14 pieces** of 1 mm are transplanted into the **nondominant forearm** in belly of **brachioradialis**^Q muscle

11. Ans. c. Inferior parathyroid lobe (Ref: Harrison 18/e p3100)

- **Parathyroid adenomas** are **most commonly located** in **inferior**^Q parathyroid glands.

12. Ans. d. Identifying hyperplasia of all 4 glands at surgery in parathyroid hyperplasia (Ref: Harrison 18/e p3104)

- **Parathyroid adenoma** can be **differentiated from hyperplasia** only at the **time of surgery**^Q.
- In case of **adenoma**, **only one gland** is found to be **enlarged**^Q, the other three are normal.
- In **hyperplasia**, **all four glands** are **enlarged**^Q.

13. Ans. d. All of the above (Ref: Schwartz 9/e p1385; Sabiston 19/e p941; Bailey 26/e p776, 25/e p804)

PARATHYROID CARCINOMA

- Accounts for approximately 1% of PHPT cases.
- Suspected preoperatively by the presence of **severe symptoms**^Q, serum **calcium levels** >14 mg/dL, significantly **elevated PTH** levels (5 x normal), and a **palpable parathyroid gland**^Q.

Clinical Features**Parathyroid Carcinoma is suspected preoperatively by**

- Presence of **severe symptoms**^Q
 - Serum **calcium levels** >14^Q mg/dL
 - Significantly **elevated PTH**^Q levels (5 x normal)
- **Palpable parathyroid**^Q gland
 - **Local invasion**^Q is most common; LN metastases in 15% and distant metastases in 33% at presentation.
 - **Intraoperatively**: Presence of a large, gray-white to gray-brown parathyroid **tumor adherent to or invasive into surrounding tissues**^Q and enlarged LN.

Diagnosis

- Accurate diagnosis necessitates **histologic examination** that reveals **local tissue invasion, vascular or capsular invasion**^Q, trabecular or fibrous stroma, and frequent mitoses.

Treatment

- Parathyroid cancer: **Bilateral neck exploration + En-bloc excision of tumor** and ipsilateral **thyroid lobe ± MRND** in presence of LN metastases^Q
- **Reoperation** for locally recurrent or metastatic disease to control hypercalcemia.
- **Cinacalcet**^Q (reduce PTH levels by directly binding to CASR cells on parathyroid) is useful in **controlling hypercalcemia** in refractory parathyroid carcinoma.

14. Ans. b. Removal of adenoma
15. Ans. d. Ultrasound-guided alcohol injection of the mass (Ref: Harrison 18/e p3105)
- Patient is a case of **recurrent hyperparathyroidism**, as she was operated previously for parathyroid adenoma.
 - In the setting of recent myocardial infarction, CHF and atrial fibrillation, any operation carries a **high risk**.
 - **Ultrasound-guided alcohol injection** in the mass is preferred in this setting.
16. Ans. a. Single adenoma
17. Ans. c. Carcinoma breast (Ref: Harrison 18/e p3106)
- Parathyroid adenoma is the MC cause of hypercalcemia^Q.
 - Malignant tumors are the MC cause of hypercalcemic crisis, of which **CA breast**^Q is the common cause.
18. Ans. b. Following surgery (Ref: Schwartz 9/e p1372-1373; Sabiston 19/e p921; Bailey 26/e p776-777, 25/e p790-792)

PARATHYROID INSUFFICIENCY OR HYPOPARATHYROIDISM

- Mostly due to **removal of the parathyroid glands** or **infarction** due to **vascular injury**^Q.
- **Vascular injury**^Q is more important.
- Cases usually present **2-5 days after operation**^Q with symptoms of **hypocalcemia** (circumoral and fingertip numbness and tingling tetany, carpopedal spasm and laryngeal stridor)^Q
- Treatment with **oral calcium** and **vitamin D supplements**^Q
- **IV calcium gluconate**^Q may be required in severe cases.

19. Ans. b. Increased uptake by bones (Ref: Schwartz 8/e p1448)

HUNGRY BONE SYNDROME

- **Hypocalcemia** in **immediate post-op period** following excision of parathyroid adenoma is due to **increased uptake by bones**^Q.
- It is known as **Hungry Bone Syndrome**

20. Ans. b. Parathyroidectomy for removal of adenoma, c. Thyrocalcitonin (Ref: Harrison 18/e p3111)

HYPERCALCEMIC CRISIS

- Patients with PHPT may occasionally **present acutely** with **nausea, vomiting, fatigue, muscle weakness, confusion**^Q, and a decreased level of consciousness; a complex referred to as hypercalcemic crisis.

- These symptoms **result from severe hypercalcemia** from uncontrolled PTH secretion, **worsened by polyuria, dehydration, and reduced kidney function**^Q and may occur with other conditions causing hypercalcemia.

- **Calcium levels** are **markedly elevated** and may be as high as **16 to 20 mg/dL**^Q.
- **Parathyroid glands** tend to be **large or multiple**, and the tumor may be palpable.
- Patients with **parathyroid cancer** or **familial HPT** are **more likely**^Q to present with hypercalcemic crisis.

Treatment

- Treatment consists of **therapies to lower serum calcium levels** followed by **surgery** to correct HPT.
- **Mainstay of therapy: Rehydration** with a **0.9% saline** and diuresis with **furosemide**^Q
- Other drugs used to lower serum calcium levels:
 - **Bisphosphonates, Calcitonin**^Q
 - **Mithramycin (plicamycin), Gallium nitrate**^Q
 - **Glucocorticoids (Hydrocortisone)**^Q

21. Ans. d. Osteosclerosis

22. Ans. b. Thyroidectomy

23. Ans. d. All of the above

24. Ans. c. Hyperparathyroidism

25. Ans. d. Total thyroidectomy (Ref: Harrison 18/e p3113)

Chronic renal failure, Hypoparathyroidism, Pseudo hypoparathyroidism are causes of hypocalcemia.

26. Ans. d. All of the above (Ref: Schwartz 9/e p1387-1388; Sabiston 19/e p938-939; Bailey 26/e p775-776, 25/e p804; Harrison 18/e p3109-3110)

SECONDARY HYPERPARATHYROIDISM

- Secondary HPT **commonly occurs in chronic renal failure**^Q
- May occur in hypocalcemia secondary to **inadequate calcium or vitamin D intake, or malabsorption**^Q.

Pathophysiology of HPT in Chronic Renal Failure

- Related to **hyperphosphatemia**^Q (and resultant hypocalcemia)
- Deficiency of 1,25-dihydroxy vitamin D due to loss of renal tissue
- Low calcium intake
- Decreased calcium absorption
- Abnormal parathyroid cell response to extracellular calcium or vitamin D in vitro and in vivo.

Clinical Features

- Patients generally are **hypocalcemic** or normocalcemic.

Treatment

- Patients generally are **hypocalcemic** or normocalcemic.

- These patients generally are **treated** medically with a **low-phosphate diet, phosphate binders**, adequate intake of **calcium and 1,25-dihydroxy vitamin D** and a **high calcium, low-aluminum dialysis bath**^Q.

- **Parathyroidectomy** should be considered if **PTH levels remain high despite optimal therapy**^Q.

Tertiary Hyperparathyroidism

- **Autonomous parathyroid gland function**^Q
- Cause problems similar to PHPT, such as pathologic fractures, bone pain, renal stones, peptic ulcer disease, pancreatitis, and mental status changes.
- **Operative intervention** is indicated in:
 - **Symptomatic disease**^Q
 - If **autonomous PTH secretion** persists for **>1 year** after a successful **transplant**^Q.

Treatment

- **Subtotal or total parathyroidectomy with autotransplantation + Upper thymectomy**^Q.

27. Ans. d. All of the above (Ref: Schwartz 9/e p1347, 1374, 1386; Sabiston 19/e p926; Bailey 26/e p742, 25/e p771-772, 803)

IDENTIFICATION OF PARATHYROID GLANDS

- Approximately 85% of the **parathyroid glands** are found **within 1 cm** of the **junction** of the **inferior thyroid artery** and **RLNs**^Q.

Upper parathyroid glands	<ul style="list-style-type: none"> • Superior to junction of inferior thyroid artery and RLNs^Q • Dorsal (posterior) to RLN^Q
Lower parathyroid glands	<ul style="list-style-type: none"> • Inferior to junction of inferior thyroid artery and RLNs^Q • Ventral (anterior) to RLN^Q

- The thin fascia overlying a "suspicious" fat lobule should be incised using a sharp curved hemostat and scalpel. This maneuver often causes the **parathyroid gland** to "**pop**" out.
- Alternatively, gentle, **blunt peanut sponge dissection** between the carotid sheath and the thyroid gland often reveals a "**float**" sign, suggesting the site of the abnormal parathyroid gland.
- **Normal parathyroids** are **light beige** and only **slightly darker or brown** compared to adjacent fat.
- **MC location of ectopic parathyroid gland: Paraesophageal**^Q > **Mediastinal** > **Intrathyroidic**

ADRENAL GLANDS

28. Ans. d. Excision of both adrenal glands (Ref: Schwartz 7/e p1639)

- Patients undergoing surgical treatment of endogenous hypercortisolism require glucocorticoid replacement.
- Steroids are not given pre-operatively because these patients are already hypercortisolemic.
- Instead hydrocortisone 100 mg IV is given after the removal of second hyperplastic adrenal gland.

29. Ans. c. Estimation of urinary metanephrines, VMA and catecholamines

The combination of symptoms suggests MEN-2A (Sipple syndrome), so the patient should be investigated for pheochromocytoma by estimation of urinary metanephrines, VMA and catecholamines.

MEN-2A (Sipple Syndrome)

- Medullary carcinoma thyroid^Q
- Pheochromocytoma^Q
- Parathyroid hyperplasia or adenoma^Q
- Hirschprung's disease^Q
- Cutaneous lichen amyloidosis^Q

30. Ans. a. Medullary carcinoma thyroid, b. Von-Hippel Lindau disease, c. Sturge Weber syndrome, e. Neurofibromatosis (Ref: Schwartz 9/e p1399-1400; Sabiston 19/e p980-984; Bailey 26/e p784-785, 25/e p813-814)

Syndromes associated with Pheochromocytoma (MVVS)	
• MEN-2A and MEN-2B ^Q	• Von-Recklinghausen syndrome ^Q
• VHL syndrome ^Q	• Sturge-Weber syndrome ^Q

31. Ans. c. Rogoff's sign www.medhelp.org

ROGOFF'S SIGN

- Costovertebral angle pain and tenderness in acute adrenal insufficiency is known as Rogoff's sign^Q.

32. Ans. c. Hyperplasia (Ref: Harrison 18/e p2897)

- MC cause of Cushing's syndrome is iatrogenic exogenous administration of steroids^Q.
- MC endogenous cause of Cushing's syndrome is bilateral adrenal hyperplasia^Q secondary to hypersecretion of ACTH from pituitary or from an ectopic non-pituitary source.

Causes of Cushing's Syndrome	
Endogenous	Exogenous
ADRENAL HYPERPLASIA <ul style="list-style-type: none"> • Pituitary ACTH overproduction: <ul style="list-style-type: none"> – Microadenoma^Q > Macroadenoma • Ectopic ACTH overproduction: <ul style="list-style-type: none"> Small cell carcinoma lung^Q – Thymus carcinoid – Carcinoma pancreas – Bronchial adenoma 	<ul style="list-style-type: none"> • Iatrogenic exogenous administration of steroids (MC cause)^Q
ADRENAL NEOPLASIA <ul style="list-style-type: none"> • Adenoma^Q • Carcinoma^Q 	

33. Ans. a. Tuberculosis (Ref: ASI 7/e p1073)

- Most common cause of adrenal insufficiency (Addison's disease) in developing countries is Tuberculosis^Q followed by autoimmune disorders.

34. Ans. d. All of the above (Ref: Schwartz 9/e p1400-1402; Sabiston 19/e p985-986; Bailey 26/e p779-780, 25/e p808-809; Harrison 18/e p2951-2952)

INCIDENTALOMA

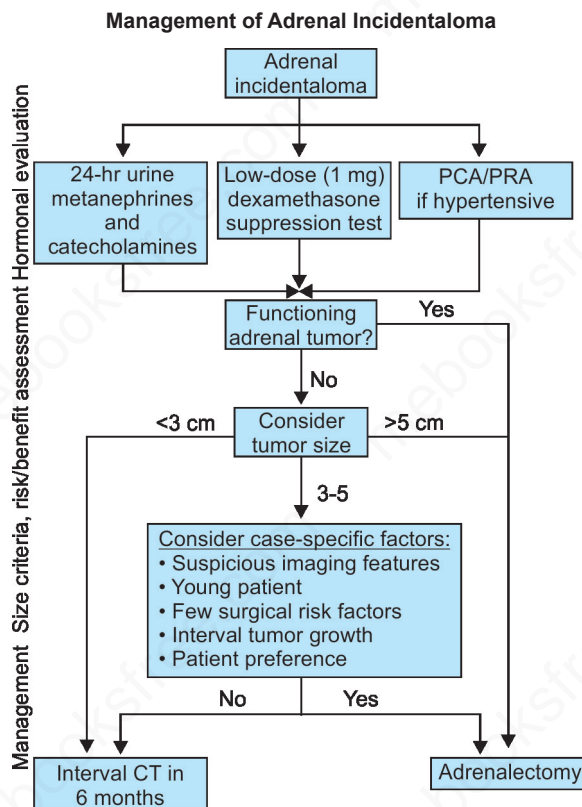
- Incidentally discovered adrenal masses discovered through imaging performed for unrelated/nonadrenal disease.
- The differential diagnosis includes both secreting and nonsecreting neoplasms.
- In patients with a history of malignancy, metastatic disease is the most likely cause of adrenal masses, particularly when bilateral^Q.
- In those without a clear history of malignancy, at least 80% of incidentalomas will turn out to be nonfunctioning cortical adenomas or other benign lesions that do not require surgical management^Q.

Clinical Evaluation

- The diagnostic work-up of an incidentaloma is aimed at identifying patients that would benefit from adrenalectomy
- The workup for adrenal incidentaloma integrates hormonal evaluation with size criteria^Q.
- Evaluation begins with history taking, with a focus on previous malignancy, hypertension, and symptoms of glucocorticoid or sex steroid excess.
- Biochemical investigations for hormonally active tumors are followed by consideration of size criteria.
- Tumors >6 cm carry a >25% risk for malignancy^Q.

- CT-guided FNAC is rarely helpful^Q in the evaluation of adrenal masses and may be hazardous.
- The diagnosis of primary adrenal malignancy cannot be reliably based on cytologic criteria alone^Q.

- Use of FNAC is generally confined to patients with a **history of extra-adrenal malignancy**^Q in whom the clinician seeks to establish the diagnosis of **metastatic disease**^Q.
- **Pheochromocytoma must be excluded**^Q before attempting such a procedure to avoid precipitating potentially fatal hypertensive crisis.



Treatment

- Surgery for **hormonally active tumors** and masses carrying **significant risk for malignancy**^Q.
- **Most incidentalomas** can be removed **laparoscopically**^Q, except for those displaying obvious malignant features on imaging.
- **Remove all incidentalomas** measuring **>5 cm** and to strongly consider removal of those measuring **3–5 cm**, **follow up** with CT, every 6-months for **<3 cm**.

Indications of surgery in Incidentaloma 3–5 cm

1. **Suspicious** imaging characteristics (**heterogeneity, high attenuation, or irregular margins**)^Q
2. **Young age**^Q
3. **Few surgical risk factors**^Q
4. **Interval tumor growth**^Q
5. Patient preference

35. Ans. a. Adrenalectomy

36. Ans. All (Ref: CSDT 11th/811-812; Bailey 25/e p808; Schwartz 9/e p1400-1402; Sabiston 19/e p985-986; Harrison 18/e p2952)

Adrenal Incidentalomas	
Tumor Types	Percentage
• Presumed non-functional adenoma (MC)	82% ^Q
• Preclinical Cushing's ^Q	5%
• Pheochromocytoma ^Q	5%
• Adrenocortical carcinoma	5%
• Metastatic carcinoma	2%
• Aldosterone producing adenoma	1%

37. Ans. d. All of the above (Ref: Schwartz 9/e p1397; Sabiston 19/e p979; Bailey 26/e p782-783, 25/e p811-812; Harrison 18/e p2953)

ADRENOCORTICAL CARCINOMA

- Adrenocortical carcinoma is a **rare tumor**
- **More than half** of adrenocortical carcinomas are **functional**^Q.
- **Cushing's syndrome**^Q is **most commonly seen**, followed by virilization.

Pathology

- Microscopically: **Hyperchromatic cells** with and have **large nuclei**, prominent nucleoli.
- It is very difficult to distinguish benign adrenal adenomas from carcinomas by histologic examination alone.
- **Capsular or vascular invasion**^Q is the **most reliable sign of cancer**.

Clinical Features

- Almost **all cases** occur in patients **40–50 years** of age
- **No gender predilection**
- **More than half** of adrenocortical carcinomas are **functional**.
- **Cushing's syndrome**^Q is **most commonly seen**, followed by virilization.
- **Very large**^Q at **initial evaluation** (mean tumor size, **9–12 cm**)
- Metastases to the lymph nodes, **liver**^Q, and lungs may be found.

Diagnosis

- **CT: Heterogeneous mass** with **irregular/indistinct borders**, **central necrosis**^Q, and invasion of adjacent structures.
- Size of adrenal mass is the **single most important criterion** to **diagnose malignancy**^Q

Treatment

- **Radical open surgery: En-bloc resection** of adjacent organs or **regional lymphadenectomy**^Q (or both).
- **Ketoconazole**, **aminoglutethimide** or **metyrapone (KAM)**: control **steroid hypersecretion**^Q.

Mitotane

- Principal chemotherapeutic agent, **derivative of insecticide DDT**^Q
- Mitotane: Used as an **adjuvant to surgery** and as **primary therapy** in **unresectable or metastatic disease**^Q.
- Use is limited by **significant gastrointestinal and neurologic toxicity**^Q.

Prognosis

- The **most important predictor of survival**: **Adequacy of resection**^Q
- **Poor prognosis**, **5-year survival** is **15–20%**
- Patients who undergo **incomplete resection** have **extremely limited life expectancy**^Q (median survival, **<1 year**).
- Prone to develop **local recurrence** and **metastases**, typically **within 2 years**.

38. Ans. b. Hyperaldosteronism (Ref: Harrison 18/e p2950)

Manifestation of Conn's Syndrome (Primary Hyperaldosteronism)	
Clinical	Laboratory
<ul style="list-style-type: none"> • Muscle weakness and fatigue (due to hypokalemia) • Hypertension without edema • Polyuria and polydipsia 	<ul style="list-style-type: none"> • Hypokalemia • Metabolic alkalosis • Hypernatremia • Increased Aldosterone • Low rennin

39. Ans. c. Enhances rapidly, contrast stays in it for a relatively longer time and washes out late (Ref: Grainger Radiology 4/e p1388; Dahmert Wolfgang Radiology Review Manual 6/e p919)

- **Adrenal adenoma** on contrast enhanced CT/MRI show **rapid uptake** and relatively **rapid washout of contrast**^Q material than do non adenomas.

CT Features of Adrenal Adenoma

- | | |
|--|---|
| <ul style="list-style-type: none"> • Well defined /sharply defined^Q • <5 cm in size^Q • Low attenuation (<10 HU) due to lipid content^Q • Mild homogenous enhancement | <ul style="list-style-type: none"> • Relatively rapid washout of contrast material (due to lack of large interstitial spaces)^Q • Relatively rapid washout is characteristic of adenoma^Q |
|--|---|

40. Ans. b. Nelson's syndrome (Ref: Harrison 18/e p2899)

NELSON'S SYNDROME

- Adrenalectomy in the setting of residual corticotroph adenoma tissue predisposes to the development of Nelson's syndrome^Q.
- Characterized by rapid pituitary tumor enlargement and increased pigmentation secondary to high ACTH levels^Q.
- Radiation therapy may be indicated to prevent the development of Nelson's syndrome after adrenalectomy^Q.

Primary adrenal Cushing's syndrome → Adrenalectomy → Loss of negative feedback to pituitary → Development of pituitary adenoma → Nelson's syndrome.

41. Ans. b. >5cm

42. Ans. d. Present at the usual location (Ref: Grainger Radiology 4/e p1722)

- Embryological development of kidneys and adrenal is different, hence even in renal agenesis, adrenal glands will be in normal position^Q.

43. Ans. d. Non-functioning adenoma

PHEOCHROMOCYTOMA

44. Ans. d. Diarrhea (Ref: Schwartz 9/e p1399-1400; Sabiston 19/e p980-984; Bailey 26/e p784-785, 25/e p813-814; Harrison 18/e p2962-2967)

PHEOCHROMOCYTOMA

- Tumors arise from chromaffin cells^Q in adrenal medulla and elsewhere
- Peak incidence in 4th and 5th decade without any gender predilection
- MC site of extra-adrenal tumor is organ of Zuckerkandl^Q

Also called 10% tumor because

- | | |
|---|---|
| <ul style="list-style-type: none"> • 10% are bilateral^Q • 10% are malignant^Q • 10% occur in pediatric patients^Q | <ul style="list-style-type: none"> • 10% are extra-adrenal^Q • 10% are familial^Q |
|---|---|

Etiology and Risk Factors

- Either familial or sporadic. Familial can be syndromic or non-syndromic.

Syndromes associated with Pheochromocytoma (MVVS)

- | | |
|---|--|
| <ul style="list-style-type: none"> • MEN-2A and MEN-2B^Q • VHL syndrome^Q | <ul style="list-style-type: none"> • Von-Recklinghausen syndrome^Q • Sturge-Weber syndrome^Q |
|---|--|

- Non-syndromic familial pheochromocytomas are most commonly associated with succinyl dehydrogenase D and B mutations^Q.

Pathology

- Most are unilateral and solitary^Q
- When pheochromocytoma develop in MEN syndrome, they are rarely malignant^Q
- In contrast, patients with germline SDHB mutation appear to have higher propensity for extra-adrenal and malignant tumors^Q
- Tumors are not innervated^Q, so catecholamines doesn't result from neural stimulation
- Tumors also secrete endogenous opioids, adrenomedullin, erythropoietin, PTHrP, neuropeptide Y and cromagranin A^Q.

- | |
|--|
| <ul style="list-style-type: none"> • Most pheochromocytoma produce both NA and Adr with NA>Adr^Q. • Extra-Adrenal pheochromocytoma secretes NA exclusively^Q (Deficiency of enzyme PNMT- Phenylethanolamine-N-Methyltransferase). • Pheochromocytoma associated with MEN secretes Adr alone^Q. • Increased production of dopamine and homovanillic acid is usually seen in malignant lesions^Q. |
|--|

Histologically Tumor Consists of

- Polygonal to spindle chromaffin cells clustered in small nests or alveoli (Zelballen) by a rich vascular network
- Nuclei are round with salt and pepper chromatin^Q

Criteria for malignancy are based exclusively on presence of metastases^Q. (because capsular or vascular invasion can be present in benign tumors)^Q

Clinical Features

- Classic triad: Headache + Diaphoresis+ Palpitation^Q

- MC symptom is **headache**^Q
- MC manifestation is **hypertension**^Q (remember hypertension is not a symptom)
- **Weight loss**^Q due to increased energy expenditure
- **Cardiac manifestations**: Sinus tachycardia, sinus bradycardia, supraventricular arrhythmia and ventricular premature contractions
- **Carbohydrate intolerance** and increased hematocrit (**volume depletion**)

Diagnosis

Biochemical test:

- Most sensitive screening test: **Urinary catecholamines and VMA level**^Q
- Best test for diagnosis: **Fractionated plasma metanephrines**^Q

Pharmacological test

- Positive response to **phentolamine** is reduction of BP of at least 35/25 mm Hg after 2 min. It is not diagnostic and biochemical confirmation is necessary.
- **Glucagon infusion** increases catecholamine release and causes **paroxysm of hypertension**^Q

Imaging

- MRI is IOC for **adrenal**^Q, **extra adrenal pheochromocytoma**^Q and in **pregnancy**^Q.
- MRI is 95% sensitive and 100% specific for pheochromocytoma^Q.
- CT scan should be performed **without contrast administration**^Q to avoid hypertensive crisis.
- MIBG scan is useful for **extra-adrenal pheochromocytoma** but IOC is **MRI**^Q even for extra adrenal pheochromocytoma.

Biopsy is contraindicated as it precipitates hypertensive crisis^Q

Treatment

- **Adrenalectomy** is **TOC**^Q.
- **Laparoscopic adrenalectomy** is preferred for **<5 cm tumors**^Q.
- **Pre-operatively alpha-blockers (phenoxylbenzamine)**^Q should be given.
- **Beta-blockers** are indicated **only if tachycardia develops** and should not be given until patient is **fully alpha blocked**^Q to avoid hypertensive crisis due to unopposed alpha stimulation.

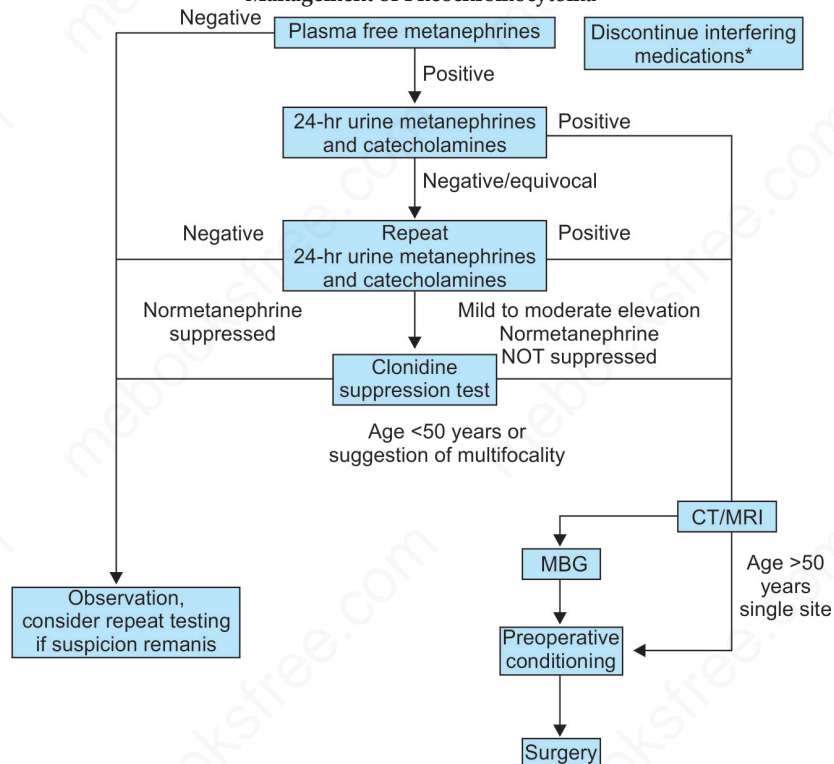
- Schwartz 9/e p1399: Recent studies have shown that **plasma metanephrines** are the **most reliable tests** to identify pheochromocytomas, with **sensitivity approaching 100%**.

45. Ans. c. Pheochromocytoma

46. Ans. b. MRI

47. Ans. a. 90% are malignant

Management of Pheochromocytoma



48. Ans. c. T2-weighted MRI with gadolinium contrast
 49. Ans. a. Arises from chromaffin cells of adrenal medulla
 50. Ans. a. Dopamine (Ref: Schwartz 9/e p1400; Sabiston 19/e p984; Bailey 26/e p785, 25/e p815; Harrison 18/e p2964)

MALIGNANT PHEOCHROMOCYTOMA

- Risk of malignancy increases with **size**^Q.
 - Malignant tumors are more likely to express **p53, Bcl-2** and have **activated telomerase**^Q.
- **Capsular and vascular invasion** may be seen in **benign lesions** as well.
 - **Malignancy** usually is **diagnosed** when there is evidence of **invasion** into **surrounding structures** or **distant metastasis**^Q.
- Increased production of **dopamine** and **homovanillic acid** is usually seen in **malignant lesions**^Q
 - **MC site of metastases** is **bone**^Q > liver > lymph nodes.
 - **Treatment:** Resection followed by **chemotherapy**^Q (cyclophosphamide + vincristine + dacarbazine)
- MDH:** Malignant pheochromocytoma secrete Dopamine and HVA^Q

51. Ans. d. FNAC is must for diagnosis
 52. Ans. b. Headache
 53. Ans. a. VMA
 54. Ans. (None)
 55. Ans. d. I¹²³ Metaiodobenzylguanidine (MIBG)
 56. Ans. a. Organ of Zuckerkandl
 57. Ans. c. Measurement of catecholamine
 58. Ans. b. Urinary catecholamine and aspiration of nodule

NEUROBLASTOMA

59. Ans. c. Hyperdiploidy (Ref: Schwartz 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 26/e p786, 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591)

Prognostic Factors in Neuroblastomas		
Variable	Favorable	Unfavorable
Stage	Stage 1, 2A, 2B, 4S ^Q	Stage 3, 4 ^Q
Age	<18 ^Q months	>18 months
Evidence of schwannian stroma and gangliocytic differentiation	Present ^Q	Absent
Mitosis-karyorrhexis index	<200/5000 cells	>200/5000 cells
DNA ploidy	Hyperdiploid or near-triploid ^Q	Near-diploid
N-MYC	Not amplified	Amplified ^Q
Chromosome 17q gain	Absent	Present ^Q
Chromosome 1p loss	Absent	Present ^Q
Chromosome 11q loss	Absent	Present ^Q
TRKA expression	Present ^Q	Absent
TRKB expression	Absent	Present ^Q
Telomerase expression	Low or absent	Highly expressed ^Q

60. Ans. b. Neuroblastoma (Ref: Schwartz 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 26/e p786, 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591)

NEUROBLASTOMA

- Arise from **neural crest**^Q and may originate anywhere along the distribution of sympathetic chain
- **MC tumor** diagnosed in **infants <1 year of age**^Q
- **MC intra-abdominal malignancy** in **children**^Q
- **Sporadic** in **majority** of cases

- **MC site:** Adrenal (30%)^Q > Paravertebral retroperitoneum^Q (28%) > Posterior mediastinum^Q (15%) > Pelvis (5%) > Cervical area^Q

- Associated with neurofibromatosis, Hirschprung's disease, heterochromia, fetal hydantoin, fetal alcohol syndrome and Freidreich's ataxia
- **Spontaneous regression** is unique behaviour especially in **stage 4S**^Q.

Pathology

- **Classic neuroblastomas:** Small, primitive-appearing cells with dark nuclei, scant cytoplasm
- **Mitotic activity**, nuclear breakdown ("karyorrhexis")^Q, and **pleomorphism** may be prominent.
- **Homer-Wright pseudo-rosettes**^Q can be found
- Immunochemical detection of **neuron-specific enolase**^Q

Clinical Features

- **MC presentation:** Fixed, lobular mass extending from the flank **toward the midline**^Q of the abdomen.
- **Most (80%) cases** present **before 4 years** and **peak incidence** is **2 years**^Q of age.
- **Metastasis** is present in **60–70%** of patients **at the time of diagnosis**^Q

- **Orbital metastasis** commonly present with **peri-orbital ecchymoses** and **proptosis** called as **Raccoon eyes**^Q.
- Infants with **stage 4S** may display **cutaneous metastasis** called as **blueberry muffin lesions**^Q.
- **Chronic watery diarrhea**^Q (due to secretion of **VIP**) and **opsoclonus-myoclonus**^Q (**Dancing eyes, dancing feet**^Q) are unusual paraneoplastic manifestations.

- **MC site of metastasis** in **older children** are **bones**^Q (**Long bones**–MC, facial bones, skull particularly **sphenoid**), bone marrow and LN.
- In **infants** metastasis is confined to **liver** or **subcutaneous tissue**^Q.
- **Lung metastasis** are **rare**^Q in **neuroblastoma**

Diagnosis

- Anemia, thrombocytopenia or **thrombocytosis** (more common)
- Increased LDH, ferritin, urinary catecholamines and neuron specific enolase
- **X-ray or CT:** **Stippled calcification**^Q (MC abdominal tumor to demonstrate calcification prior to chemotherapy)

- **Drooping Lily sign:** Neuroblastoma displaces **kidney inferolaterally**^Q
- **MRI**^Q is **superior to CT** in assessing **vessel encasement**, **vessel patency**, **spinal cord compression** and **bone marrow involvement**.

- **MIBG scan** or **SRS** are used in the diagnosis of primary, residual and metastatic neuroblastoma.
- **MIBG** is one of the **single best studies** to document the **presence of metastatic**^Q disease.
- **Appearance** of neuroblastoma **in bone marrow** may **simulate** the appearance of **ALL**^Q, differentiation can be done by monoclonal antibody phenotype^Q.

Treatment

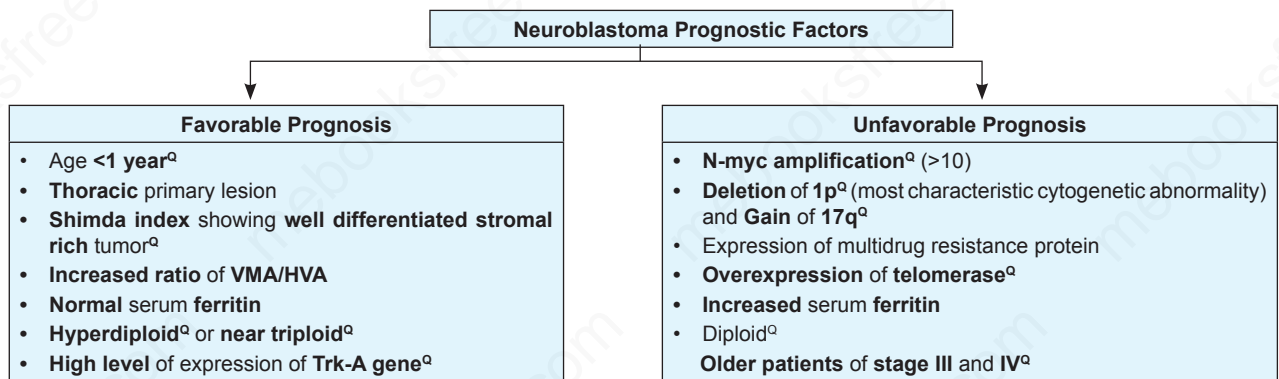
- **Localized neuroblastoma:** **Excision**^Q
- **Unresectable tumor:** **Biopsy**, initially treated by **chemotherapy** and **radiotherapy** followed by **surgical resection** of residual tumor^Q
- **Disseminated disease:** **Chemotherapy**^Q (Cyclophosphamide, vincristine, dacarbazine, doxorubicin, Cisplatin)

Prognosis

- **Shimada classification**^Q describes prognosis based on the **degree of differentiation**, **mitosis-karyorrhexis index**, **presence or absence of schwannian stroma**^Q.

International Neuroblastoma Staging System	
Stage	Definition
1	Localized tumor with complete gross excision , with or without microscopic residual disease; representative ipsilateral LNs negative for tumor microscopically (nodes attached to and removed with the primary tumor may be positive)

2A	Localized tumor with incomplete gross excision ; representative ipsilateral nonadherent LNs negative for tumor microscopically
2B	Localized tumor with or without complete gross excision, with ipsilateral nonadherent LNs
3	Unresectable unilateral tumor with contralateral regional LN involvement ; or midline tumor with bilateral extension by infiltration (unresectable) or by LN involvement
4	Any primary tumor with dissemination to distant LNs, bone, bone marrow, liver, skin, and/or other organs (except as defined for stage 4S)
4S	Localized primary tumor (as defined for stage 1, 2A, or 2B), with dissemination limited to skin, liver, and/or bone marrow (limited to infant <1 year of age)



61. Ans. c. Splenomegaly

62. Ans. a. Seen in adrenal glands, b. ↑ VMA/HVA, d. Presents with abdominal mass

63. Ans. c. Lung metastasis are common (Ref: Nelson's 18/e p2138; Robbins 7/e p500, 501; Ghai 6th/573; Neuroblastoma by Pochedly (1990)/154)

NEUROBLASTOMA

- Lung metastasis are rare in neuroblastoma
- Metastasis is present in 60–70% of patients at the time of diagnosis^a
- Common sites of metastasis: Long bones (MC), Liver, Lymph nodes and Skin
- Encasement of abdominal aorta and IVC by tumor is common
- Some neuroblastomas are sharply demarcated with a **fibrous pseudocapsule** but others are far more infiltrative and **invade surrounding strictures** including the kidney, renal vein, IVC and envelop the aorta

- Neuroblastoma is the MC extracranial solid tumor in childhood
- Neuroblastoma is the 2nd MC solid malignancy of childhood after brain tumors.
- MC solid tumor in childhood: Brain tumors^a
- MC intra abdominal solid tumor in childhood: Neuroblastoma^a

Feature	Neuroblastoma	Wilm's Tumor
Common tumor	MC intra-abdominal solid tumor in children ^a	MC renal tumor in children
At the time of diagnosis	Already metastatic in >50% of patients ^a	Generally confined to the kidney
Lung Metastasis	Rare ^a	Common
Encasement of Aorta	Characteristic ^a	Uncommon
Calcification	Common (Stippled calcification ^a)	Rare

64. Ans. b. Neuroblastoma

65. Ans. d. Esthesio-neuroblastoma

(Ref: Dhingra 5/e p217-218; Washington Manual of Surgical Pathology 2/e p45; Harrison 18/e p820)

ESTHESIONEUROBLASTOMA (OLFACTORY NEUROBLASTOMA)

- Esthesioneuroblastoma is a **rare** unique tumor of **neural crest origin**^Q
- Arises from the **basal neural cells** of the **olfactory mucosa** of the **cribriform plate**, upper nasal wall and superior turbinate^Q
- Seen in **either sex** and most common in 3rd and 4th decade

Clinical Features

- Presents as a **unilateral polypoidal mass** in the **upper third** of the **nasal cavity** with symptoms of nasal obstruction, epistaxis and anosmia^Q
- It is a **vascular tumor** that **bleeds profusely on biopsy**^Q
- LN and systemic metastases can occur

Treatment

- Favored treatment is **surgical excision followed by radiation**^Q.

SECTION 2

HEPATOBIILIARY PANCREATIC SURGERY

CHAPTERS

- ❖ Liver
- ❖ Portal Hypertension
- ❖ Gallbladder
- ❖ Bile Duct
- ❖ Pancreas

MULTIPLE CHOICE QUESTIONS

LIVER ABSCESS

- Most common cause of liver abscess in chronic granulomatous disease:** (ILBS 2012)
 - Klebsiella
 - Staph. aureus
 - Peptostreptococcus
 - E. coli
- Most common cause of liver abscess:** (AIIMS GIS May 2011)
 - E. coli
 - Proteus
 - Klebsiella
 - Staphylococcus
- Which of the following is the most common cause of pyogenic liver abscess?** (All India 2012, AIIMS GIS Dec 2009) (Recent Question 2014)
 - Trauma
 - Biliary tract infection
 - Colonic diverticulitis
 - Appendicitis
- All are true about pyogenic liver abscess except:**
 - Most common route of infection is biliary tree
 - Most common site is right lobe (JIPMER GIS 2011)
 - Klebsiella is most common in gas forming abscess
 - Percutaneous drainage is least cured
- All are true about amoebic liver abscess except:**
 - Metronidazole is mainstay of treatment (PGI Nov 2010)
 - Multifocal abscess can not be treated by aspiration
 - More common in left side
 - More common in female
- Indication of aspiration in liver abscess:** (PGI June 2008)
 - Left lobe abscess
 - Deep and less than 5 mm size
 - Multiple
 - Recurrent
 - Refractory to treatment after 48–72 hours
- Liver abscess ruptures most commonly in:** (AIIMS GIS 2003)
 - Pleural cavity
 - Peritoneal cavity
 - Pericardial cavity
 - Bronchus
- True about amebic liver abscess:** (AIIMS GIS May 2008)
 - Male: female >10:1
 - Not predisposed by alcohol
 - More common in diabetics
 - E. histolytica is isolated in >50% from blood culture
- Not an indication for percutaneous aspiration in amebic liver abscess:** (AIIMS GIS May 2008)
 - Radiographically unresolved lesion after 6 months
 - Suspected diagnosis
 - Left lobe liver abscess
 - Compression or outflow obstruction of hepatic or portal vein
- Commonest cause of pyogenic liver abscess:** (AIIMS Sept 96)
 - Aspiration
 - Hematogenous spread from a distant site
 - Direct contact
 - Lymphatic spread
- Anchovy sauce pus is a feature of:** (All India 99)
 - Amebic liver abscess
 - Lung abscess
 - Splenic abscess
 - Pancreatic abscess
- In pyogenic liver abscess commonest route of spread is:** (AIIMS Nov 98, AIIMS Nov 95)
 - Hematogenous through portal vein
 - Ascending infection through biliary tract
 - Hepatic artery
 - Local spread
- True about pyogenic liver abscess:** (PGI June 2001)
 - Single and large abscess
 - X-ray features are diagnostic
 - Serology is confirmatory investigation
 - Systemic complaints, fever and jaundice common
 - Liver enzyme abnormalities are common and severe
- True about amoebic liver abscess:** (PGI Dec 2000)
 - Frequently associated with diarrhea at presentation
 - Most common in right lobe liver
 - Can rupture into pleural cavity
 - Almost never respond to metronidazole
- Indications for needle aspiration in liver abscess are:** (PGI June 2006)
 - Recurrent
 - Left lobe
 - Refractory to treatment after 48–72 hours
 - >10 cms size
 - Multiple
- True treatment regarding hepatic amoebiasis:** (PGI 96)
 - More common in females
 - Multiple lesions
 - Mostly treated conservatively
 - Jaundice is common
- Which one of the following is not corrected regarding amoebic liver abscess?** (ICS 2005)
 - Its usual occurrence is in the right lobe
 - Patient is toxic
 - Surgical drainage is always indicated
 - Extension of abscess from liver to pericardium is the most dreaded complication
- All are used in treatment of amoebic liver abscess except:**
 - Diloxanide furoate
 - Chloroquine
 - Metronidazole
 - Emetine (MAHE 2007)
- Not true about amebic liver abscess is:** (DPG 2006)
 - Adult forms are seen
 - Conservative treatment is generally seen
 - Larvae are seen
 - USG can diagnose it

20. Which of the following statement is true regarding pyogenic liver abscess? (MCI Sept 2009)

- Diagnosis can be confirmed by serological test
- Radiographic features are diagnostic
- Usually a large and single abscess is seen in cases of direct spread
- Systemic manifestations are uncommon

21. A patient with 8 cm x 8 cm abscess in right lobe of liver was treated with aspiration multiple times (3 times) and with systemic amebicide. Now cavity is remaining in right lobe of liver but there is nothing in the cavity. Seven days course of luminal amebicides is given. How will you follow up?

- Stool examination only (AIIMS Nov 2012)
- USG weekly for 1 month followed by monthly USG till 1 year
- USG weekly for 3 months followed by CT scan at 3 months.
- USG or CT scan monthly and stool examination weekly

22. A young patient presents to the emergency department with fever and right upper quadrant pain. Clinical examination reveals obvious hepatomegaly but there is no jaundice. Ultrasound reveals a solitary, homogeneous, hypoechoic lesion in the right lobe measuring 5cmx5cmx4cm. Tests for hydatid disease were negative. Which of the following is the best recommendation for initial treatment? (All India 2011)

- Multiple aspirations and antiamoebics/antibiotics
- Catheter drainage and antiamoebics/antibiotics
- Antiamoebics/antibiotics alone
- Hepatectomy followed by antiamoebics/antibiotics

HYDATID CYST

23. Water lily appearance in a chest radiograph suggests:

(COMEDK 2005, 2004)

- Metastasis
- Cavitating metastasis
- Aspergilloma
- Ruptured hydatid cyst

24. Which of the following is not a sign of pulmonary hydatidosis? (COMEDK 2010)

- Water lily sign
- Rising sun sign
- Meniscus sign
- Drooping lily sign

25. False about hydatid cyst of liver: (PGI Nov 2010)

- Hepatic resection is never done
- Laparoscopic aspiration of cyst is performed
- Most commonly located in the right liver
- Mostly asymptomatic
- Most common causative organism is Echinococcus granulosus

26. Not an indication for PAIR treatment in hydatid cyst:

(PGI Nov 2010)

- Size >5cm
- Multiloculated
- Cyst in lung
- Recurrence after surgery
- Perforated cyst

27. Capitonage is used in treatment of? (MHSSMCET 2008)

- Choledochal cyst
- Dermoid cyst
- Hydatid cyst
- Renal cyst

28. True about hydatid cyst of liver:

(PGI June 2004)

- Caused by E. granulosus
- In 80% cases cyst in single
- Blood culture helpful
- Surgery is the only treatment

29. In the treatment of hydatid cyst, PAIR is contraindicated in:

(PGI Dec 2006)

- Lung cyst
- Size > 5cm

- Not amenable to treatment with albendazole
- Multiple
- Inaccessible location

30. True about hydatid disease:

(PGI June 2005)

- MC site is lung
- Pre-op albendazole followed by surgery is the treatment of choice
- 20% saline is scolical
- Puncture, aspiration, injection, and respiration (PAIR) done in hepatic hydatids

31. Diagnosis of hydatid disease is by:

(PGI June 98)

- Biopsy
- X-ray
- Casoni test
- Serum examination

32. A 40-years old male presents with a painless cystic liver enlargement of four years duration without fever or jaundice. The most likely diagnosis is: (UPSC 96)

- Amoebic liver abscess
- Hepatoma
- Hydatid cyst of liver
- Choledochal cyst

33. All are complications of hydatid cyst in the liver except:

(APPG 97)

- Jaundice
- Suppuration
- Cirrhosis
- Rupture

34. During surgical exploration for hydatid cyst of the liver, any of the following agents can be used as scolical agent except: (UPSC 2004)

- Hypertonic sodium chloride
- Formalin
- Cetrimide
- Povidone iodine

35. Which of the following is true about hydatid cyst of liver?

(Recent Question 2014) (DPG 2007)

- Surgical management is done always
- Conservative treatment is effective
- Aspiration is safe
- E. multilocularis is the most common cause

36. Treatment of hydatid cyst:

(APPG 2008)

- Excision of cyst
- Percutaneous drainage
- Conservative management
- None

37. Investigation of choice for hydatid disease is:

(MCI Sept 2009)

- CT scan
- Elisa
- Biopsy
- USG

38. Medical management of hydatid disease is indicated in

(All India 92)

- Pregnancy
- Infected hydatid cyst
- Moribund patients
- Multiple peritoneal cyst

39. The sensitivity of Casoni's test is:

(APPG 84, Kerala 87)

- 50%
- 60%
- 75%
- 90%
- 95%

HEPATIC ADENOMA

40. False about hepatic adenoma:

(ILBS 2012)

- Chances of malignancy in 10% cases
- Rupture in 20% cases
- Hepatic architecture is maintained
- Most patients are symptomatic

41. All are true about liver adenoma except:

(AIIMS GIS May 2011)

- Normal liver architecture
- Increased fat
- Increased glycogen
- Cells arranged in cords

42. About hepatic adenoma, all are true except:

(AIIMS GIS Dec 2009)

- Increased glycogen and fat in hepatocytes
- Normal liver architecture
- Bile ductules are not seen
- Tumor markers are normal

43. **Most common cause of non-traumatic hemo-peritoneum:**
 a. Hepatic adenoma b. FNH (AIIMS GIS 2003)
 c. HCC d. Hemangioma

44. **Most common liver tumor in those on OCPs?** (MHSSMCET 2007)
 a. HCC b. Liver cell adenoma
 c. Bile duct adenoma d. Focal nodular hyperplasia

45. **All are true about hepatic adenoma except:** (JIPMER GIS 2011)
 a. Usually multiple
 b. OCP is a predisposing factor
 c. Has cords of benign hepatocytes
 d. 50-75% are symptomatic

46. **Which of the following liver tumors always merit surgery?** (DPG 2009 March)
 a. Hemangioma
 b. Hepatic adenoma
 c. Focal nodular hyperplasia
 d. Peliosis hepatis

FOCAL NODULAR HYPERPLASIA

47. **Central stellate scar is seen in:** (AIIMS GIS May 2011)
 a. FNH b. Hemangioma
 c. Hepatic adenoma d. HCC

48. **All of the following are true regarding FNH except:** (AIIMS GIS Dec 2010)
 a. Not frequently associated with OCPs
 b. Surgical resection is required due to risk of malignancy
 c. Stellate scar is diagnostic
 d. Typical hepatic vascularity is not seen with spoke wheel pattern

49. **True statement regarding focal nodular hyperplasia:** (PGI Nov 2011)
 a. More common in young women
 b. Associated with OCP use
 c. May present with abdominal pain
 d. Excision biopsy may aid in diagnosis
 e. Progress to cirrhosis

50. **Similarity between FNH and hepatic adenoma are all except:** (AIIMS GIS 2003)
 a. Hemoperitoneum is common
 b. Biliary abnormalities are seen
 c. More common in females
 d. Associated with OCPs

51. **Which one of the following hepatic lesions can be diagnosed with high accuracy by using nuclear imaging?** (AIIMS Nov 2004)
 a. Hepatocellular carcinoma
 b. Hepatic adenoma
 c. Focal nodular hyperplasia
 d. Hemangioma

HEMANGIOMA

52. **All are true about liver hemangioma except:** (AIIMS GIS Dec 2006)
 a. CHF is very common
 b. Incidental detection
 c. Consumptive coagulopathy can occur
 d. Spontaneous regression is seen

53. **Most common benign tumor of liver is:** (DNB 2005, 2000, JIPMER GIS 2011)
 a. Hemangioma b. Hepatic adenoma
 c. Hepatoma d. Hamartoma

54. **CECT with nodular enhancement is suggestive of:** (AIIMS GIS Dec 2006)
 a. Hepatic adenoma b. FNH
 c. Hemangioma d. HCC

55. **Most common nodule found in the liver is:** (PGI 87)
 a. Hepatoma b. Hamartoma
 c. Hemangioma d. Cholangiodenoma

56. **Which is the commonest incidentaloma detected in the liver?** (Karnataka 94)
 a. Focal nodular hyperplasia b. Hemangioma
 c. Hepatocellular adenoma d. Hydatid cyst

HEPATIC CYST

57. **Solitary hepoechoic lesion of the liver without septa or debris is most likely to be:** (AIIMS Nov 2005)
 a. Hydatid cyst b. Caroli's disease
 c. Liver abscess d. Simple cyst

58. **Simple hepatic cyst, all are true except:** (AIIMS GIS Dec 2006)
 a. Asymptomatic
 b. Lined by columnar epithelium
 c. Intracystic bleeding is common and deroofing is mandatory
 d. Congenital

POLYCYSTIC LIVER DISEASE

59. **Treatment of symptomatic polycystic liver disease is:** (DPG 2008)
 a. Deroofing of the cyst
 b. Injection of sclerosant
 c. Hepatic resection
 d. Liver transplantation

HEPATOCELLULAR CARCINOMA RISK FACTORS

60. **All are risk factors for HCC except:** (AIIMS GIS Dec 2006)
 a. HBV b. HCV
 c. Alcohol d. IBS

61. **Which of the following most significantly increases the risk of HCC?** (AIIMS May 2012)
 a. HBV b. HAV
 c. CMV d. EBV

62. **True regarding HCC:** (JIPMER 2010)
 a. Non alcoholic steatohepatitis is a risk factor
 b. OCP's are a cause
 c. Focal nodular hyperplasia may turn malignant
 d. Chromosomal abnormalities are common

63. **True about hepatocellular carcinoma is:** (PGI June 2002)
 a. Associated with HBV and HCV
 b. Cirrhosis is predisposing factor
 c. Fibrolamellar variety is not associated with cirrhosis
 d. Low propensity of vascular invasion
 e. Alcoholic cirrhosis does not predispose to HCC

64. **In hepatocellular carcinoma, risk factor most important is:** (PGI June 97)
 a. Alcoholic hepatitis
 b. Schistosomiasis
 c. Cirrhosis
 d. Fasciolepis buski infestation

HEPATOCELLULAR CARCINOMA

65. **Tumor marker of HCC:** (AIIMS GIS 2003)
 - a. AFP
 - b. Alpha fucosidases
 - c. DCGP
 - d. Carbohydrate antigen
66. **In high risk population, HCC is best detected by:**
 - a. USG
 - b. CT (AIIMS GIS 2003)
 - c. MRI
 - d. PET scan
67. **All are true about AFP except:** (AIIMS GIS 2003)
 - a. Not return to normal after hepatic resection
 - b. Levels >400 ng/mL with typical radiological findings is diagnostic of HCC
 - c. Can be raised in other benign conditions
 - d. Fibrolamellar HCC has normal levels
68. **AFP is elevated in:** (PGI May 2011)
 - a. HCC
 - b. Hepatoblastoma
 - c. Infant hemangioendothelioma
 - d. Amoebic liver abscess
 - e. Embryonic sarcoma
69. **Okuda staging contains all except:** (ILBS 2012)
 - a. Bilirubin
 - b. Tumor size
 - c. Ascites
 - d. AFP
70. **In HCC:** (AIIMS GIS 2003)
 - a. Arterial bruit is present in 80% cases
 - b. Two third patients present with signs of liver disease
 - c. Hemoperitoneum in 7% patients
 - d. Percutaneous biopsy is mandatory for diagnosis
71. **Most common paraneoplastic syndrome of HCC:** (AIIMS GIS 2003)
 - a. Hypoglycemia
 - b. Hypertension
 - c. Hypercalcemia
 - d. Erythrocytosis
72. **Oncological outcome in HCC is described by all except:** (AIIMS GIS Dec 2010)
 - a. MELD
 - b. BCLC
 - c. CLIP
 - d. OKUDA
73. **The following are true about HCC except:** (AIIMS Nov 2003)
 - a. It has a high incidence in East Africa and South East Asia
 - b. Its worldwide incidence parallels the prevalence of hepatitis B
 - c. Over 80% of tumors are surgically resectable
 - d. Liver transplantation offers the only chance of cure in those with unresectable disease
74. **The most unlikely clinical feature of hepatocellular carcinoma is:** (All India 94)
 - a. Hepatomegaly
 - b. Raised AFP levels
 - c. Raised alkaline phosphatase
 - d. Jaundice
75. **True about carcinoma liver:** (PGI Dec 2000)
 - a. AFP increased in 70% cases
 - b. Resection possible in few cases only
 - c. USG guided biopsy is good for diagnosis
 - d. Aflatoxin and thorotrast are not risk factor
76. **True about Hepatocellular carcinoma:** (PGI Dec 2002)
 - a. Most common tumor of liver
 - b. Resectable only in 1% cases
 - c. AFP increased in 70% cases
 - d. USG guided aspiration biopsy is used for diagnosis
77. **Spontaneous rupture of the liver occurs in:** (BHU 88)
 - a. Hepatoma
 - b. Portal hypertension
 - c. Spherocytosis
 - d. Secondary deposits
78. **Tumour marker of hepatocellular carcinoma:** (PGI June 2003)
 - a. AFP
 - b. CEA
 - c. HCG
 - d. CA 19-9
 - e. CA-125
79. **Tumor marker for primary hepatocellular carcinoma are all except:** (AIIMS May 2007)
 - a. Alpha-feto protein
 - b. Alpha-2 macroglobulin
 - c. PIVKA-2
 - d. Neurotensin
80. **True about hepatocellular carcinoma:** (PGI June 2004)
 - a. Most prevalent malignancy
 - b. Commonest liver tumor
 - c. HBV predisposes
 - d. Patient present in early stage
 - e. Prognosis good
81. **All of the following are modalities of therapy for hepatocellular carcinoma except:** (AIIMS Nov 2005)
 - a. Radiofrequency ablation
 - b. Transarterial catheter embolization
 - c. Percutaneous acetic acid
 - d. Nd-YAG laser ablation
82. **Which of the following liver tumour has a propensity to invade the portal or hepatic vein?** (AIIMS June 2004)
 - a. Cavernous hemangioma
 - b. Hepatocellular carcinoma
 - c. Focal nodular hyperplasia
 - d. Hepatic adenoma
83. **Ramu, 40-years old male, chronic alcoholic, diagnosed as cirrhosis, presents with a lump in the right lobe of liver. Serum AFP level is normal. Most probable diagnosis is:** (AIIMS June 2001)
 - a. Fibrohyperplasia
 - b. Hepatocellular carcinoma
 - c. Secondaries
 - d. Hepatocellular adenoma
84. **Liver malignancies can be studied by:** (PGI 88)
 - a. Radionuclide study
 - b. Ultrasound
 - c. CT
 - d. Laparoscopy
 - e. All
85. **Least common presentation of HCC:** (AIIMS GIS 2003)
 - a. PUO
 - b. Mass
 - c. Jaundice
 - d. Weakness
86. **Hypercalcemia is seen in:** (AIIMS GIS May 2011)
 - a. Pancreatic cancer
 - b. HCC
 - c. CA stomach
 - d. CA GB
87. **All are tumor markers of HCC except:** (PGI SS Dec 2010)
 - a. Neurotensin
 - b. AFP
 - c. CA 19-9
 - d. PIVKA-2
88. **New drug in HCC:** (GB Pant 2010)
 - a. Sorafenib
 - b. Bevacizumab
 - c. Sunitinib
 - d. Cetuximab
89. **Consider the following features - Asian Male, alcoholic cirrhosis, hypervascular lesion during arterial phase of CT & Portal vein thrombosis. The above features are mostly suggestive of: (APPG 2016) Place it after question no. 88 in chapter no 4 liver.**
 - a. Cholangiocarcinoma
 - b. Hepatocellular carcinoma
 - c. Metastatic colorectal carcinoma
 - d. Neuroendocrine tumors
90. **The screening for HCC in chronic liver disease is:** (MHCET 2016))
 - a. Serial USG + AFP
 - b. Serial LFT + AFP
 - c. Serial LFT + CT Scan
 - d. Serial USG + Serial LFT

FIBROLAMELLAR HCC

91. **All are true about fibrolamellar HCC except:** (AIIMS GIS Dec 2009)
 - a. AFP is not raised
 - b. Recurrence is common
 - c. Raised neurotensin levels
 - d. Well demarcated and encapsulated

92. **True statement about fibrolamellar carcinoma:** (GB Pant 2010)
 a. Young adults, children b. More in males
 c. Related to OCP use d. Bad prognosis
93. **All are true about fibrolamellar HCC except:** (AIIMS GIS 2003)
 a. Associated with cirrhosis
 b. Recurrences are seen despite of better prognosis
 c. Increased neurotensin and vitamin B12 binding factor
 d. Lymph node metastasis is seen
94. **All of the following are true about fibrolamellar carcinoma of the liver except:** (JIPMER 2012, All India 2001)
 a. More common in females
 b. Better prognosis than HCC
 c. AFP levels always >1000 pg/ml
 d. Occur in younger individuals

LIVER SECONDARIES

95. **All of the following modalities can be used for in situ ablation of liver secondaries, except:** (All India 2006)
 a. Ultrasonic waves b. Cryotherapy
 c. Alcohol d. Radiofrequency
96. **Multiple liver secondaries are most common in the following cancers:** (AIIMS 84)
 a. Head of pancreas b. Stomach
 c. Gall bladder d. Periapillary
97. **All are considered to be poor prognostic factors in liver metastasis except:** (JIPMER GIS 2011)
 a. Synchronous lesions b. Metachronous lesions
 c. Extra-hepatic metastasis d. CEA >200 ng/ml
98. **Calcific hepatic metastases are seen in:** (COMEDK 2009)
 a. Adenocarcinoma of the colon
 b. Carcinoid tumours
 c. Renal cell carcinoma
 d. Lymphoma
99. **Which of the following liver metastasis appear hypoechoic on ultrasound?** (All India 2012)
 a. Breast cancer b. Colon cancer
 c. RCC d. Mucinous adenocarcinoma

HEPATOBLASTOMA

100. **All are true about hepatoblastoma except:** (AIIMS GIS May 2008, Dec 2006)
 a. Associated with FAP b. Most cases <3 years
 c. Prognosis is very poor with pulmonary metastasis
 d. Treatment is chemotherapy followed by surgical resection
101. **All are true about hepatoblastoma except:** (PGI SS June 2005)
 a. Present in childhood
 b. Common in cirrhosis of liver due to HBV
 c. Chemosensitive
 d. Surgical resection is treatment of choice
102. **AFP is raised in:** (KGMC 2011)
 a. 100% of hepatoblastoma b. 90% of hepatoblastoma
 c. 100% of HCC d. 90% of HCC

HEMANGIOENDOTHELIOMA

103. **All are true about hemangioendothelioma except:** (ILBS 2012)
 a. Adult variant is benign
 b. More common in females
 c. Multiple and involve bilateral lobe
 d. An indication for liver transplant

104. **All of the following are true regarding epithelioid hemangioendothelioma except:** (AIIMS GIS Dec 2010)
 a. Most common in males
 b. Liver transplantation is treatment of choice
 c. Associated with vinyl chloride
 d. Factor VIII staining is used for diagnosis

CYSTADENOMA AND CYSTADENOCARCINOMA

105. **False in cystadenoma:** (ILBS 2012)
 a. More common in females due to OCP use
 b. Cystadenocarcinoma presents as hemorrhagic fluid
 c. Internal septations are better delineated by USG than CT
 d. Most patients are symptomatic
106. **True about biliary cystic adenocarcinoma:** (PGI Nov 2009)
 a. CT scan is used for diagnosis
 b. CA 19-9 is elevated c. Intrahepatic location
 d. Extrahepatic location e. Common in males
107. **All are true about hepatic cystadenoma except:** (AIIMS GIS Dec 2006)
 a. Age >40 years and asymptomatic
 b. Malignant predisposition
 c. Surgical resection is required
 d. Large projection with thickened wall is suggestive of malignancy

LIVER TRANSPLANTATION

108. **Most common indication for liver transplantation in children is:** (JIPMER GIS 2011)
 a. Biliary atresia
 b. Indian childhood cirrhosis
 c. HCC
 d. Hepatitis C infection
109. **Place of first liver transplant:** (ILBS 2011)
 a. Pittsburgh b. Boston
 c. Colorado d. Cambridge
110. **Indications of liver transplantation are all, except:**
 a. Biliary atresia b. Sclerosing cholangitis
 c. Hepatitis A d. Cirrhosis (PGI June 2005)
 e. Fulminant hepatic failure
111. **Auxiliary orthotopic liver transplant is indicated for:** (AIIMS May 2008)
 a. Metabolic liver disease
 b. As a standby procedure until finding a suitable donor
 c. Drug induced hepatic failure
 d. Acute fulminant liver failure for any cause
112. **In orthotopic liver transplantation, which is the best way to get bile drainage in donor liver?**
 a. Donor bile duct with recipient bile duct or Roux-en-Y choledochojejunostomy
 b. Donor bile duct with duodenum of recipient
 c. Donor bile duct with jejunum of recipient
 d. External drainage for few days followed by choledochojejunostomy
113. **Reduced liver transplants:** (GB Pant 2011)
 a. Given to two recipients after dividing into two parts
 b. Left lateral lobe divided and given to child
 c. Left lateral segment divided from segment 2 and given to child
 d. Part of liver segment transplanted into recipient depending upon requirement

114. Liver after transplantation enlarges by: (Recent Question 2015)

- Increase in size of cell
- Increase in number of cells
- Both
- None

115. All are indications of liver transplanatation except:

(Recent Question 2014)

- Cholangiocarcinoma
- Cirrhosis
- Biliary atresia
- Fulminant hepatitis

- Conservative management
- Abdominal exploration and packing of hepatic wounds
- Abdominal exploration and ligation of left hepatic artery
- Left hepatectomy

124. 'Beer-Claw' appearance on CECT abdomen is seen in:

(MHEET 2016)

- Hepatic laceration
- Pancreatic laceration
- HCC
- RCC

HEPATIC RESECTION

116. Contraindications to major hepatic resection for metastatic disease includes all of the following except:

(COMEDK 2006, Karnataka 2006)

- Total hepatic involvement
- Advanced cirrhosis
- Extrahepatic tumour involvement
- Jaundice from extrinsic ductal obstruction

117. The minimum amount of normal perfused liver parenchyma to be left intact when a hepatic resection is planned is:

- 10%
- 20% (COMEDK 2008, 2007)
- 50%
- 75%

118. Regarding hepatic artery ligation which statement is false? (Karnataka 96)

- The best results are obtained in case of hemobilia
- Not useful in primary hepatoma
- Can cure secondary carcinoma
- Must be covered by massive antibiotic administration

119. Vascular inflow occlusion of the liver is by: (DNB 2012)

- Clamping the hepatic artery
- Occluding the portal vein
- Clamping the hepatic veins
- The Pringle maneuver

120. Pringle Maneuver may be required for treatment of:

- Injury to tail of pancreas (APPG 2015)
- Mesenteric ischemia (Recent Question 2014)
- Bleeding esophageal varices
- Liver Laceration

121. Left trisegmentectomy involves removal of: (GB PANT 2010)

- Segment II III IV V VIII
- Segment II III IV
- Segment IV V VI VII VIII
- Segment V VI VII VIII

HEPATIC REGENERATION

122. Following resection of 2/3rd of the liver, regeneration is complete within: (BHU 87)

- 2-3 months
- 8-10 weeks
- 4-6 months
- 4-5 weeks

LIVER TRAUMA

123. A 17-years old boy is admitted to the hospital after a road traffic accident. Per abdomen examination is normal. After adequate resuscitation, his pulse rate is 80/min and BP is 110/70 mmHg. Abdominal CT reveals 1 cm deep laceration in the left lobe of the liver extending from the dome more than half way through the parenchyma. Appropriate management at this time would be: (DPG 2011, UPSC 2005)

LIVER ANATOMY

125. Left posterior sector of liver consists of: (JIPMER GIS 2011)

- Segment II and III
- Segment II, III and IV
- Segment II only
- Segment I only

126. All of the following are true about caudate lobe except:

(AIIMS GIS Dec 2010)

- Blood supply from both right and left hepatic artery
- Ductal drainage from both right and left duct
- Venous drainage is mainly by left and middle hepatic vein
- Supply by both branches of portal vein

127. Which is not true regarding the basis of functional divisions of Liver? (AIIMS May 2015)

- Based on portal vein and hepatic vein
- Divided into 8 segments
- There are three major and three minor fissures
- 4 sectors

128. Left medial sector contains segment: (GB Pant 2010)

- III, IV
- II, III
- I, II
- I, IV

129. The caudate lobe of liver corresponds to with segment of Couinaud's classification: (PGI Dec 2006)

- Segment I
- Segment II
- Segment III
- Segment IV
- Segment V

130. Portal triad is not formed by: (Punjab 2008)

- Hepatic artery
- Portal Vein
- Bile duct
- Hepatic vein

131. Function of hepatic Kupffer cells is: (COMEDK 2004)

- Formation of sinusoids
- Vitamin A storage
- Increase blood perfusion
- Phagocytosis

132. Which of the following is false about portal vein?

- Formed behind the neck of pancreas (JIPMER 2011)
- Bile duct lies anterior and right to it
- Gastro duodenal artery lies to the left and anterior to it
- Ascends behind the 2nd part of duodenum

133. Surgeon excises a portion of liver to the left of the attachment of the falciform ligament. The segments that have been resected are: (All India 2011, 2008)

- Segment 1a and 4
- Segment 1 and 4b
- Segment 2 and 3
- Segment 1 and 3

134. False about hepatic duct: (AIIMS May 2011, 2009)

- Left hepatic duct formed in umbilical fissure
- Caudate lobe drains only left hepatic duct
- Right hepatic duct formed by V and VIII segments
- Left hepatic duct crosses IV segment

135. Surgical lobes of liver are divided on the basis of:

- Hepatic artery
- Hepatic vein
- Bile ducts
- Portal vein (PGI June 2002)
- Central veins

136. In Couinaud's classification, segment IV of liver is:
a. Caudate lobe b. Quadrate lobe
c. Right lobe d. Left lobe (AIIMS Nov 2007)
137. Line of surgical division of the lobes of the liver is:
a. Falciform ligament to the diaphragm (AIIMS 85, 87)
b. Gall bladder bed to IVC
c. Gall bladder bed to the left crus of diaphragm
d. One inch to the left of falciform ligament to the IVC
138. What percentage of the blood flow to the liver is supplied by the hepatic artery? (UPSC 86, JIPMER 88)
a. 90% b. 20%
c. 40% d. 60%
139. With Couinaud's nomenclature, which one of the following segments of liver has an independent vascularization?
a. Segment I b. Segment II (UPSC 2002)
c. Segment IV d. Segment VIII
140. The Couinaud's segmental nomenclature is based on the position of the: (All India 2004)
a. Hepatic veins and portal vein
b. Hepatic veins and biliary ducts
c. Portal vein and biliary ducts
d. Portal vein and hepatic artery
141. Quadrate lobe of liver is present between: (DPG 97)
a. Groove for ligamentum teres and gallbladder
b. Inferior vena cava and fissure for ligamentum venosum
c. Groove for inferior vena cava and fissure for ligamentum venosum
d. Porta hepatis and falciform ligament
142. Boundary of Morrison's pouch is formed by: (DPG 2008)
a. Kidney
b. Falciform ligament of liver
c. Spleen
d. Pancreas
143. The right lobe of liver consists of which of the following segments: (AIIMS 2004)
a. V, VI, VII and VIII
b. IV, V, VI, VII and VIII
c. I, V, VI, VII and VIII
d. I, IV, V, VI, VII and VIII
144. Liver is divided in 2 halves by all except: (AIIMS 2004)
a. Right hepatic vein b. Portal vein
c. Hepatic artery d. Common bile duct
145. Which of the following is not a capsular plate? (AIIMS Nov 2011)
a. Portal plate b. Hilar plate
c. Umbilical plate d. Cystic plate
146. Right hepatic duct drains all, except: (AIIMS May 2009)
a. Segment I b. Segment III
c. Segment V d. Segment VI
147. Number of lobes in liver as per Couinaud's classification:
a. 3 b. 4 (MCI March 2005)
c. 6 d. 8
149. Which is wrong about Crigler-Najjar syndrome Type-I?
a. Very high level of unconjugated bilirubin occurs in neonatal period (Orissa 2011)
b. Kernicterus is usual
c. It responds well to phenobarbitone
d. Hepatic histology is normal
150. Conjugated hyperbilirubinemia is seen in: (COMEDK 2011)
a. Dubin-Johnson syndrome
b. Crigler-Najjar syndrome
c. Crigler-Najjar syndrome-II
d. Gilbert syndrome
151. Most common surgical cause of obstructive jaundice:
a. Periapillary carcinoma (NEET 2013, Punjab 2007)
b. Carcinoma gallbladder
c. Carcinoma head of pancreas
d. CBD Stones
152. True about Crigler-Najjar syndrome II: (PGI Nov 2011)
a. Autosomal dominant
b. Kernicterus is frequently present
c. Child may live to adolescence
d. Cause unconjugated hyperbilirubinemia
e. Phenobarbitone therapy is ineffective
153. True about obstructive jaundice: (PGI May 2011)
a. Unconjugated bilirubin
b. Positive indirect Vanden Bergh test
c. Pruritus
d. Pale stools
e. Icterus
154. In non hemolytic jaundice, urobilinogen is seen in: (PGI 99)
a. Obstructive jaundice b. Hepatic fibrosis
c. Fatty liver d. Infective hepatitis
155. Best test to differentiate between medical and surgical jaundice is?
a. Alkaline phosphatase
b. Bilirubin and serum enzymes
c. Enzymes
d. Ultrasound
156. Courvoisier's law is related to: (AIIMS 79, AMC 81, 84)
a. Jaundice
b. Ureteric calculi
c. Portal hypertension
d. The length of skin flap in skin grafting
157. Which of the following is an exception of Courvoisier's law? (Recent Question 2015)
a. Double impaction b. Portal lymphadenopathy
c. Periapillary CA d. None
158. Which is not elevated in a child presenting with jaundice, icterus, pruritus and clay colored stools?
a. Gamma glutamyl transpeptidase
b. Alkaline phosphatase (AIIMS Nov 2011, Nov 2006)
c. 5'-nucleotidase
d. Glutamate dehydrogenase
159. One is not the feature of obstructive jaundice: (AIIMS Nov 95)
a. Pruritus
b. Elevated level of serum bilirubin
c. Raised alkaline phosphatase
d. Raised urinary urobilinogen
160. Vitamin to be corrected in obstructive jaundice: (DNB 2009)
a. Vitamin K
b. Vitamin C
c. Vitamin D
d. Vitamin B12

LIVER FUNCTION TESTS AND JAUNDICE

148. A patient has a surgical cause of obstructive jaundice. USG can tell all of the following except: (AIIMS Nov 2012)
a. Biliary tree obstruction
b. Peritoneal deposits
c. Gall bladder stones
d. Ascites

161. A 50 years old patient presented with progressive jaundice. Liver function test was done in which conjugated serum bilirubin- 4.8% and total bilirubin- 6.7%, alkaline phosphatase- 550 IU, SGOT-50, SGPT-65. Most probable diagnosis is:

(AIIMS Nov 2013)

- Jaundice due to choledocholithiasis
- Dubin-Johnson syndrome
- Viral hepatitis
- Malignant obstructive jaundice

MISCELLANEOUS

162. Liver biopsy is done through 8th ICS midaxillary line to avoid:

(All India 97)

- Lung
- Pleural cavity
- Subdiaphragmatic space
- Gall bladder

163. "Crumbled egg appearance" in liver is seen in:

- Hepatic adenoma
- Chronic amoebic liver abscess
- Hydatid liver disease
- Hemangioma

164. Honey-comb liver is seen in:

(JIPMER 87)

- Micronodular cirrhosis
- Dubin Johnson's syndrome
- Actinomycosis
- Hydatidosis

165. Primary sinusoidal dilatation of liver is also known as:

(COMEDK 2010)

- Hepar lobatum
- Peliosis hepatic
- Von-Meyerburg complex
- Caroli's disease

166. Obstruction of IVC leads to:

(Punjab 2008)

- Dilatation of thoracoepigastric veins
- Caput medusae
- Hemorrhoids
- Esophageal varices

167. Middle aged man presents with complaints of weakness, fatigue and hyperpigmentation. On examination hepatomegaly and hypoglycemia are present. Diagnosis:

(JIPMER 2011)

- Addison's disease
- Hemochromatosis
- IDDM
- Cushing's syndrome

168. A 20 years old male presents with extrapyramidal symptoms and liver damage. Diagnosis:

- Wilson's disease
- Huntington's disease
- Parkinson's disease
- Hemochromatosis

169. Risk factor for angiosarcoma of liver: (MHSSMCET 2008)

- OCPs
- Vinyl chloride
- Phenacetin
- All of the above

170. Focal lesion of liver is best detected by: (AIIMS GIS 2003)

- MRI
- USG
- CT
- PET scan

EXPLANATIONS

LIVER ABSCESS

1. Ans. b. *Staph. aureus* (Ref: Sabiston 19/e p1440-1444; Schwartz 10/e p1284-1285, 9/e p1115; Bailey 26/e p1080, 25/e p1094; Blumgart 5/e p1006-1115; Shackelford 7/e p1464-1471)

Pyogenic Liver Abscess in Children

- In children, *Staphylococcus PLA*^Q is most common
- Occurs in the setting of **chronic granulomatous disease**^Q, disorder of granulocyte function and **hematologic malignancies**.
- In chronic granulomatous conditions, abscess are **dense and thick**, **early excision** and **treatment with antibiotics** against *Staphylococcus aureus* is recommended^Q.

PYOGENIC LIVER ABSCESS

- Liver is MC site of **abdominal visceral abscess**^Q
- PLA accounts for **majority** of hepatic abscesses^Q
- Higher incidence of **cryptogenic abscess** occur in **Asian series**^Q
- No **significant gender, ethnic or geographic differences** in disease frequency^Q
- Associated comorbid conditions: **Cirrhosis, CRF, history of malignancy**

E. coli	MC in western countries ^Q
Klebsiella pneumoniae	MC in Asian countries ^Q
Staphylococcus	MC in children , suffering from chronic granulomatous disease ^Q

- **Multiple abscesses** occur in patients with a **biliary origin**^Q
- **Solitary abscesses** are more likely than multiple abscesses to be **polymicrobial**.

Routes of Infection in PLA

- **Biliary tract (MC)**:^Q
 - **CBD stones** leading to **cholangitis** (in **Asia**)^Q
 - **Hilar cholangiocarcinoma** in **western countries**^Q
 - **CBD strictures**
- **Portal vein (2nd MC)**^Q
- **Hepatic artery**:^Q
 - Hematogenous spread, usually **monomicrobial**, *staphylococcus* or *streptococcus*
- **Direct extension**:
 - From **subdiaphragmatic abscess**
 - From **suppurative cholecystitis**
 - From **empyema in chest**
 - From **perinephric abscess**
- **Penetrating or blunt trauma**
- **Cryptogenic**

Clinical Features

- MC **presenting symptom** is **fever**^Q.
- MC **LFT abnormality** is an elevation of **ALP**^Q.
- **Classic Presentation**: **Fever, jaundice (25%)**^Q, and **right upper quadrant pain and tenderness**
- **Fever, chills, and abdominal pain** are the most common presenting symptoms
- Usually **single**, involve **right lobe**^Q
- **Malignancy, jaundice, deranged LFT and sepsis** are associated with poor prognosis.

Endogenous Endophthalmitis in PLA

- A rare complication specific to **Klebsiella**^Q hepatic abscesses
- Occurring in **3%** of cases.
- More common in **diabetic patients**^Q.
- **Early diagnosis** and **treatment** represent the best chance to **preserve visual function**^Q.

Diagnosis

- **USG and CT** are the **main diagnostic modalities**^Q

- ## Treatment

2. Ans. a. E. coli 3. Ans. b. Biliary tract infection
4. Ans. d. Percutaneous drainage is least cured
5. Ans. c. More common in left side, d. More common in female (Ref: Sabiston 19/e p1445-1447; Schwartz 10/e p1285; 9/e p1115-1116; Bailey 26/e p1081, 25/e p1095; Blumgart 5/e p1016-1024; Shackelford 7/e p1471-1478)

- Caused by **Entamoeba histolytica** whose cysts are acquired through the **feco-oral route**^Q
- Trophozoites reach the liver through **portal venous system**^Q.

- Majority of patients are **young men** (may be due to heavy alcohol consumption)

Pathogenesis

- MC form of invasive disease is **colitis**, frequently affects the **cecum** and **ascending colon**^Q
- In colon: **Flask-shaped ulcers**^Q (MC site: **Cecum** and **ascending colon**)^Q
- **Synchronous hepatic abscess** is found in **one third** of patients with active amebic colitis.

Clinical Features

- MC symptom is abdominal pain^Q
- Typical clinical picture: Patient of 20-40 yrs of age, with history of travel to **endemic area**, presents with **fever**, chills, anorexia, **right upper quadrant pain^Q**.
- Results from an obligatory colonic infection, a **recent history of diarrhea** are **uncommon^Q**.

- Active colitis and amoebic liver abscess rarely occur simultaneously, as a rule colonic lesions are silent^Q
- Jaundice is rare^Q
- Raised PT is MC LFT abnormality^Q.

Diagnosis

- **USG and CT are the main diagnostic modalities**

- **Diagnosis is confirmed** by serological tests^Q (ELISA) for antiamebic antibodies.
- **Cultures** of amoebic abscess are **usually sterile** or **negative**^Q.

- **CXR:** Elevated hemidiaphragm, right sided pleural effusion or atelectasis
- **ALA:** **Reddish-brown anchovy paste^o**; **more reliable characteristic** than color is the **odour** of the fluid.

Treatment

- **Metronidazole** (750 mg orally TDS X 10-14 days) is the **mainstay of treatment** and is **curative in over 90%** of patients^Q, clinical improvement is seen within 3 days.
- **Luminal agents** include **iodoquinol**, **paromomycin** and **diloxanide furoate**^Q.
- The average time to **radiologic resolution** of abscess is **3-9 months**

Indications of Aspiration in ALA

- | | |
|--|---|
| 1. Diagnostic uncertainty ^q | 4. High risk of rupture (size >5 cm, left lobe abscess) ^q |
| 2. Failure to respond to therapy in 3-5 days ^q | 5. Pregnancy ^q (Therapeutic trial with high dose Metronidazole is deemed inappropriate) |
| 3. Pyogenic superinfection ^q | |

Complications

- Most frequent complications: Rupture into the **peritoneum (MC)**^Q, pleural cavity, or pericardium.
- Size of **abscess** appears to be the **most important risk factor** for rupture
- **Laparotomy** is indicated in cases of doubtful diagnosis, **hollow viscus perforation**, **fistulization** resulting in hemorrhage or sepsis, and **failure of conservative therapy**.
- Treatment of rupture into the pleural space: **Thoracentesis**^Q
- **Rupture into bronchi** is **self-limited** with **postural drainage** and **bronchodilators**^Q.

6. Ans. a. Left lobe abscess, e. Refractory to treatment after 48-72 hours
7. Ans. b. Peritoneal cavity
8. Ans. a. Male: female >10:1
9. Ans. a. Radiographically unresolved lesion after 6 months (Ref: Sabiston 19/e p1447)

AMOEBIIC LIVER ABSCESS

- Although **clinical improvement after adequate treatment** with antiamebic agents is the rule, **radiologic resolution** of the abscess cavity is **usually delayed**.
- The **average time to radiologic resolution** is **3 to 9 months** and can take as long as years in some patients.
- Studies have shown that **more than 90%** of the **visible lesions disappear radiologically**, but a small percentage of patients are left with a clinically irrelevant residual lesion.

10. Ans. b. Hematogenous spread from a distant site

Hematogenous spread is most common among the given options.

11. Ans. a. Amebic liver abscess

12. Ans. b. Ascending infection through biliary tract

13. Ans. a. Single and large abscess, d. Systemic complications fever and jaundice common (Ref: Sabiston 19/e p1443)

Clinical Features	Amebic Liver Abscess	Pyogenic Liver Abscess
Age (yr)	20-40 ^a	>50 ^a
Male-to-female ratio	≥10:1 ^a	1.5:1
Solitary vs. multiple	Solitary 80% ^a	Solitary 50% ^a
Location	Usually right liver ^a	Usually right liver ^a
Travel in endemic area	Yes ^a	No
Diabetes	Uncommon (~2%)	More common ^a (~27%)
Alcohol use	Common	Common
Jaundice	Uncommon	Common ^a
Elevated bilirubin	Uncommon	Common ^a
Elevated alkaline phosphatase	Common	Common
Positive blood culture	No	Common ^a
Positive amebic serology	Yes ^a	No

14. Ans. b. Most common in right lobe liver, c. Can rupture into pleural cavity

15. Ans. b. Left lobe, d. >10 cms size

16. Ans. c. Mostly treated conservatively

17. Ans. c. Surgical drainage is always indicated

18. Ans. a. Diloxanide furoate (Ref: KDT 5/e p753)

DILOXANIDE FUROATE

- Diloxanide furoate is highly effective luminal amebicide^o but has no systemic anti-amebic activity^o, because furoate ester is hydrolysed in the intestine and the released diloxanide is absorbed.
- Diloxanide is a weaker amebicide than its furoate ester and no systemic antiamebic activity is seen despite its absorption.

19. Ans. c. Larvae are seen (Ref: Bailey and Love 25/e p1095, 24/e p1077, Schwartz 10/e p1285, 9/e p1116, 8/e p1164)

Larvae are not seen in amoebic liver abscess.

20. Ans. c. Usually a large and single abscess is seen in cases of direct spread

21. Ans. b. USG weekly for 1 month followed by monthly USG till 1 year (Ref: Sabiston 19/e p1445-1447; Schwartz 9/e p1115-1116; Bailey 25/e p1095; Blumgart 5/e p1016-1024; Shackelford 7/e p1471-1478)

In uncomplicated cases of amebic liver abscess, follow-up is done with ultrasound.

Role of ultrasound in the diagnosis and treatment follow-up of amoebic liver abscess, by K. Shamsi, A. De Schepper, F. Deckers, E. de Bergeyck, J. Van den Ende

"Serological and clinical data in combination with these non-specific sonographic features are sufficient for the management of ALA, obviating the need for expensive and invasive techniques in majority of the cases." - <http://link.springer.com/article/10.1007%2FBF00221420?LI=true>

22. Ans. c. Antiamebics/antibiotics alone

- Presence of a **solitary homogeneous, hypoechoic lesion** in the **right lobe** of the liver in a **young patient** with **fever** and **right upper quadrant pain** suggests a diagnosis of **amebic liver abscess**.
- The **initial treatment of choice** for amebic liver abscess is **metronidazole alone**.
- Multiple aspirations and/ or catheter drainage or hepatectomy have **no role** in the "initial" management of amebic liver abscess.

HYDATID CYST

23. **Ans. d. Ruptured hydatid cyst** (Ref: *Sabiston 19/e p1447-1449; Schwartz 10/e p1285-1286, 9/e p1116; Bailey 26/e p1081, 25/e p1095-1096; Blumgart 5/e p1035-1048; Shackelford 7/e p1459-1462*)

HYDATID DISEASE

- Hydatid disease is a **zoonosis**, occurs primarily in **sheep-grazing areas**^Q of the world
- Endemic in Mediterranean countries, Middle East, Far East, South America, Australia, New Zealand, and East Africa.**
 - Humans contract the disease from dogs**, and there is **no human-to-human transmission**^Q.
 - Hydatid cyst is caused by **Echinococcus granulosus**^Q.
 - Other species affecting human beings: **E. multilocularis, E. vogelli, E. oligarthus**^Q

Life-cycle

- Dogs** are the **definitive host**^Q of **E. granulosus**
- Eggs are passed (up to thousands of ova daily) and deposited with the dog's feces.
 - Sheep:** Usual **intermediate host**^Q
 - Human:** **Accidental dead end intermediate host**^Q without human to human transmission
- In the **human duodenum**, parasitic embryo releases an **oncosphere**, that **penetrate mucosa**, allowing access to **bloodstream**^Q.
- In the blood, **oncosphere** reaches **liver (MC)**^Q or **lungs**, develops its **larval stage, hydatid cyst**.
- Organs most commonly involved are: **Liver >Lungs >Spleen >Kidney >Brain >Bone**^Q.

Hydatid Cyst

- Three weeks after infection, a visible hydatid cyst develops
 - The cyst wall has two layers:
 - Ectocyst:** outer **gelatinous membrane**^Q
 - Endocyst:** inner **germinal membrane**^Q
 - Pericyst:** Fibrous capsule **derived from host tissues**, develops around the hydatid cyst.
 - Scolexes** develop into an **adult tapeworm in definitive host**^Q
 - Scolexes **differentiate into a new hydatid cyst in intermediate host**^Q
 - Hydatid sand:** Freed brood capsules and scolexes in the hydatid fluid
- ### Clinical Features
- Equally common** in males and females, age of **45 years**.
 - Most (75%)** are **singular**, located in **right liver (VII and VIII)**^Q.
 - Mostly asymptomatic**^Q until complications occur
 - MC presenting symptoms:** Abdominal pain, dyspepsia and vomiting.
 - MC sign:** **Hepatomegaly**^Q
 - Complications:** Rupture of the cyst into the **biliary tree (MC)**^Q or **bronchial tree**, or free rupture into **peritoneal, pleural, or pericardial cavities**.
 - Intrabiliary rupture** is **MC complication of hydatid liver cysts**^Q
 - Free ruptures can result in disseminated echinococcosis and a potentially fatal anaphylactic reaction.

Diagnosis

- USG and CT** are the **main diagnostic modalities**^Q
 - Daughter cyst** within the **large cyst (rosette appearance)** and **calcification of the wall** are **highly suggestive of hydatid cyst**^Q.
 - Diagnosis is confirmed by serological tests**^Q (**ELISA, Immunoblot, Arc-5, IHA**) for antibodies.
- In cases of **suspected biliary involvement (Jaundice)**, **ERCP (gold standard)**^Q or **PTC** is necessary.

Treatment

- Most cysts** are **treated surgically**^Q
- Conservative management** is appropriate in **elderly patients with small, asymptomatic, densely calcified cysts**^Q.
- Treatment options:** PAIR, pericystectomy, marsupialization, leaving the cyst open, drainage of the cyst, omentoplasty, or partial hepatectomy to encompass the cyst.
- Currently, **PAIR** is the **preferred method of treatment**^Q for anatomically and surgically appropriate lesions

Surgery remains the treatment of choice for cysts where

- PAIR is not possible** or cysts are **refractory to PAIR**^Q
- For **complicated cysts** (communicating with biliary tract)^Q

- **Radical (resection) and conservative (drainage and evacuation)** surgical approaches appear to be **equally effective** at controlling disease.
- **Pericystectomy** is the **preferred surgical approach**^Q (complete cyst with surrounding fibrous tissue are removed)
- If surgical **cystectomy** is **not** technically **feasible**, then formal **liver resection** can be done.

Chemotherapy in Hydatid Disease

- Chemotherapy with **albendazole** or **mebendazole** is effective at **shrinking the cysts**
- **Cyst disappearance** occurs in **fewer than 50%** of patients^Q.
- **Preoperative treatment** may **decrease the risk for spillage**^Q and is a reasonable and safe practice.
- **Chemotherapy without definitive resection** or drainage is only considered for:
 - **Widely disseminated disease**^Q
 - Patients with **poor surgical risk**^Q

Treatment of E. multilocularis

- E. multilocularis cyst is **always multiloculated**^Q.
- Treatment is **surgical resection**^Q.

24. Ans. d. Drooping lily sign (Ref: Wolfgang 2/e p309)

- **Drooping lily sign** is seen in **neuroblastoma** and **duplication of ureter**^Q.
- Duplication of ureter: **Drooping lily sign**^Q on IVP (Non visualized upper pole of a duplex system displaces the lower pole down, looking like a drooped down lily flower on IVP)

Characteristic Signs of Pulmonary Hydatidosis

- | | |
|---|--|
| <ul style="list-style-type: none"> • Meniscus sign^Q • Double arc sign^Q • Moon sign^Q | <ul style="list-style-type: none"> • Water lily sign^Q • Crescent sign^Q |
|---|--|

WHO Classification of Hydatid Cyst

CL Type	
CE 1	• Well-circumscribed liquid image with a clearly defined wall
CE 2	• Concentric hyperechogenic halo around the cyst which may contain free-floating hyperechogenic foci called hydatid sand ^Q
CE 3	• Multivesicular cyst with the daughter and grand-daughter cysts identified by honeycomb, rosette, spoke wheel or cluster images ^Q
CE 4	• Partial or total detachment of the laminated layer with floating undulated hyperechogenic membranes showing the dual wall, water lilly and water snake signs ^Q .
CE 5	• Cystic and solid components ^Q together without visible daughter cysts.
CE 5	• Matrix or amorphous mass with a solid or semisolid appearance ; limited amount of calcification; least common type.

- Only **completely calcified cyst** (eggshell appearance) is accepted as a **dead cyst**.
- CL, CE 1, and CE 2 are active fertile cysts; CE 3 is a **transitional cyst** with degeneration started; CE 4 is a degenerated cyst; CE 5 is a calcified cyst; CE 4 and CE 5 is **inactive cyst**.

Gharbi Classification of Hydatid Cyst

Type I	Pure (clear) fluid collection ^Q
Type II	Fluid collection with a split wall (Floating membrane) ^Q
Type III	Fluid collection with septa (Honeycomb image) ^Q
Type IV	Heterogeneous complex mass ^Q
Type V	Calcified mass (eggshell) ^Q

25. Ans. a. Hepatic resection is never done

26. Ans. b. Multiloculated, c. Cyst in lung, d. Recurrence after surgery, e. Perforated cyst

27. Ans. c. Hydatid cyst: (Ref: Blumgart 5/e p1045)

Methods of management of the residual cavity after Cyst evacuation

<ul style="list-style-type: none"> • External tube drainage • Capsulorrhaphy • Capitonnage^Q • Myoplasty 	<ul style="list-style-type: none"> • Omentoplasty^Q • Internal collapse^Q • Introflexion^Q • Marsupialization^Q 	<ul style="list-style-type: none"> • Introflexion plus omentoplasty • Cystojejunostomy or Cystogastrostomy
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28. Ans. a. Caused by *e. granulosus*, b. In 80% cases, cyst in single
 29. Ans. a. Lung cyst, e. Inaccessible location (Ref: Sabiston 19/e p1449; Bailey 26/e p1081, 25/e p1095; Blumgart 5/e p1047-1048; Shackelford 7/e p1461)

PAIR (PUNCTURE, ASPIRATION OF CYST CONTENT, INJECTION OF SCOLICIDAL AGENT, AND REASPIRATION)

- Currently, PAIR is the **preferred method of treatment**^Q for anatomically and surgically appropriate lesions
- The **efficacy of PAIR** in managing hydatid cysts is >75%.
- During PAIR, patient is given prophylactic coverage of albendazole

Scolicidal Agents

- Hypertonic (20%) saline**^Q: 100% scolical with contact time of 6 minutes
- 0.5% **cetrimide** with 0.05% **chlorhexidine**^Q
- Absolute alcohol**^Q
- 10% **povidone iodine**^Q

Contraindications of PAIR

- Superficially located cysts^Q
- Inaccessible or hazardous location**^Q of cyst
- Cysts with **multiple internal septal**^Q divisions (**honeycombing pattern**)
- Dead or inactive cysts**^Q
- Cysts **communicating with biliary tree**^Q
- Lung or brain cysts**^Q

30. Ans. b. Pre-op albendazole followed by surgery is the treatment of choice, c. 20% saline is scolical, d. Puncture, aspiration, injection, and respiration (PAIR) done in hepatic hydatids
 31. Ans. d. Serum examination 32. Ans. c. Hydatid cyst of liver 33. Ans. c. Cirrhosis
 34. Ans. b. Formalin 35. Ans. c. Aspiration is safe (Ref: Bailey and Love 25/e p1095, 24/e p167)
 Aspiration is safe in Hydatid cyst of liver.
 36. Ans. b. Percutaneous drainage 37. Ans. b. ELISA
 38. Ans. d. Multiple peritoneal cyst, c. Moribund patients (Ref: Sabiston 19/e p1449)

Chemotherapy in Hydatid Disease

- Chemotherapy with **albendazole** or **mebendazole** is effective at **shrinking the cysts**
- Cyst disappearance** occurs in **fewer than 50%** of patients^Q.
- Preoperative treatment** may **decrease the risk for spillage**^Q and is a reasonable and safe practice.
- Chemotherapy without definitive resection or drainage** is only considered for:
 - Widely disseminated disease**^Q
 - Patients with poor surgical risk**^Q

39. Ans. b. 60%

The sensitivity of Casoni's test varies from 55-65%^Q.

Most Common			
	Symptom	Sign	Laboratory abnormality
Pyogenic abscess	Fever ^Q	RUQ tenderness ^Q	Raised ALP ^Q
Amebic abscess	Abdominal pain ^Q	Hepatomegaly ^Q	Raised PT ^Q
Hydatid cysts	No symptom or Abdominal pain ^Q	RUQ mass ^Q	Eosinophilia

HEPATIC ADENOMA

40. Ans. c. Hepatic architecture is maintained (Ref: Sabiston 19/e p1451; Schwartz 10/e p1290-1291, 9/e p1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1258-1262; Shackelford 7/e p1564-1565)

HEPATIC ADENOMA

- Benign** proliferative disorder of hepatocytes
- Predominantly found in **young women (20-40 years)**, associated with **OCPs**^Q
- Usually **single**^Q (multiple lesions in 12-30%)

Pathology

- Composed of **CORDS** of **benign hepatocytes** containing **increased glycogen** and **fat**, without **bile ductules**, **fibrous septa**, **portal tracts** or **central vein**^Q.

- **Bile ductules** are **not seen**, only few or **no Kupffer cells** are seen^Q.
- **Normal architecture** of the liver is **not present**^Q in these lesions.

- Contain large plates of hepatocytes separated by **dilated sinusoids** which are **perfused solely by peripheral arterial feeding vessels (lack portal venous supply)**, under **arterial pressure**^Q.
- **Hemorrhage** and **necrosis**^Q are commonly seen

Clinical Features

- Symptomatic (upper **abdominal pain**) in 50-75%^Q, related to hemorrhage or local compressive symptoms.
- Tumor markers (**AFP**) are **normal**^Q.

- Two major risks: **Rupture** (with potentially life-threatening **intraoperative hemorrhage**) and **malignant transformation**^Q.
- Risk for **rupture** is 30-50%, **related to size**^Q.
- Risk for **transformation** into **HCC** is **low**^Q.

Diagnosis

- **MRI**: Well-demarcated heterogeneous mass containing **fat** or **hemorrhage**.

CT Findings in Hepatic Adenoma

- **Hypervascular** and **heterogeneous** on the **arterial phase** and become isodense or hypodense on the portal phase as a result of **arteriovenous shunting**
- Distinctive findings from FNH: **Smooth surface** (95%), presence of **necrosis and hemorrhage** (25%), and **tumor capsule** (25%)^Q.
- **Angiography**: **Hypervascular** well circumscribed tumor **supplied by peripheral arteries**^Q.
- Radiological imaging can accurately identify most of these tumors.
- **Resection** may be necessary to **secure a diagnosis in difficult cases**^Q.

Treatment

- **Acute hemorrhage**: **Hepatic artery embolization**^Q, after stabilization, resection of the mass.
- **Resection** for **symptomatic masses**^Q
- **Resection before a planned pregnancy**, as behavior during pregnancy has been unpredictable

41. Ans. a. Normal liver architecture 42. Ans. b. Normal liver architecture 43. Ans. a. Hepatic adenoma
 44. Ans. b. Liver cell adenoma 45. Ans. a. Usually multiple
 46. Ans. b. Hepatic adenoma (Ref: Bailey 24/e p1079; Taber's Medical Dictionary 19/e p1600)

Hepatic adenoma always merits surgery. As **no characteristic radiological features** to **differentiate** these lesions from **malignant tumor**. These tumors are thought to **have malignant potential** and **resection** is therefore the **treatment of choice**^Q.

FOCAL NODULAR HYPERPLASIA

47. Ans. a. FNH (Ref: Sabiston 19/e p1451-1452; Schwartz 10/e p1291, 9/e p1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1255-1258; Shackelford 7/e p1563-1564)

FOCAL NODULAR HYPERPLASIA

- FNH is **second MC benign tumor**^Q of the liver.
- Usually a **small (<5 cm) nodular mass** arising in a normal liver, involves right and left liver equally.
- Mainly seen in **young women**, associated with **OCPs use**^Q

Pathology

- **Central fibrous scar**^Q with **radiating septa** in the mass
- Microscopically: Cords of benign-appearing hepatocytes divided by multiple fibrous septa originating from a central scar.
- **Typical hepatic vascularity** is **not seen** with **atypical biliary epithelium**^Q

- **Central scar** contains a **large artery** that branches out into multiple smaller arteries in a **spoke-wheel pattern**^Q (on angiography)

Clinical Features

- **Incidental finding** at laparotomy or more commonly on imaging studies in most patients.
- **Vague abdominal pain** in symptomatic cases
- **AFP** levels are **normal**.

Diagnosis

- Most cases of FNH can be diagnosed radiologically, on **CECT** or **MRI**
- **Homogeneous mass** with a **central scar**^Q that rapidly enhances during the arterial phase of contrast administration.
- Histologic confirmation and resection for definitive diagnosis if radiologic diagnosis is difficult

Treatment

- **No treatment**^Q in asymptomatic patients with typical radiologic features
- **Resection** in cases of **diagnostic uncertainty**, for **histologic confirmation**^Q.

48. Ans. b. Surgical resection is required due to risk of malignancy
 49. Ans. a. More common in young women, b. Associated with OCP use, c. May present with abdominal pain, d. Excision biopsy may aid in diagnosis
 50. Ans. a. Hemoperitoneum is common
 51. Ans. c. Focal Nodular Hyperplasia

HEMANGIOMA

52. Ans. a. CHF is very common (Ref: Sabiston 19/e p1452-1453; Schwartz 10/e p1289-1290, 9/e p119; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1250-1255; Shackelford 7/e p1560-1563)

LIVER HEMANGIOMA

- MC benign tumor of the liver^Q.
- Mainly seen in women of 45 years^Q.
- Small capillary hemangiomas (no clinical significance), larger cavernous hemangiomas
- Usually single and <5 cm in diameter, occur equally in right and left liver^Q.
- Giant hemangioma: Lesions >5 cm

Pathology

- Microscopically: Endothelium-lined, blood-filled spaces that are separated by thin, fibrous septa.
- Enlargement of hemangiomas are by ectasia^Q rather than neoplasia.

Clinical Features

- Most commonly asymptomatic and incidentally found^Q on imaging studies.
- Large compressive masses may cause vague upper abdominal symptoms^Q.
- Kasabach-Merritt syndrome^Q: Syndrome of thrombocytopenia and consumptive coagulopathy, rarely seen
- LFTs and tumor markers are normal^Q

Diagnosis

- Diagnosis is made radiologically.
- CT and MRI are diagnostic if a typical peripheral nodular enhancement^Q pattern is seen.
- Percutaneous biopsy is potentially dangerous and inaccurate, not recommended^Q.

Treatment

- Observation for asymptomatic cases^Q
- Enucleation with inflow control is TOC for symptomatic cases^Q

53. Ans. a. Hemangioma 54. Ans. c. Hemangioma
 55. Ans. c. Hemangioma 56. Ans. b. Hemangioma (Ref: Sabiston 19/e p1451-1453; Schwartz 10/e p1288-1289, 9/e p119-1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1250-1262)

Hemangioma	Hepatic Adenoma	Focal Nodular Hyperplasia	Peliosis Hepatis
<ul style="list-style-type: none"> • MC hepatic neoplasm^Q • Benign in nature • CT scan showing characteristic appearance of slow contrast enhancement due to small vessel uptake^Q in the hemangioma • Little malignant potential, hemangioma is not an indication for surgery^Q 	<ul style="list-style-type: none"> • Rare benign liver tumors • No characteristic radiological features to differentiate these lesions from malignant tumors^Q • These tumors are thought to have malignant potential and resection is the treatment of choice^Q 	<ul style="list-style-type: none"> • Benign condition^Q of unknown etiology • Focal overgrowth^Q of functioning liver tissue supported by fibrous stroma • Patients are middle aged females^Q, no association with underlying liver disease • Sulphur colloid scan of liver is useful for diagnosis. FNH contain both hepatocytes and Kupffer cells^Q. The latter take up the colloid, differentiating FNH from either a benign adenoma or a primary or metastatic cancer, none of which contains a significant number of Kupffer cells^Q. 	<ul style="list-style-type: none"> • Multiple cystic blood filled spaces^Q in the liver associated with dilatation of the sinusoids^Q. • Leads to hepatic enlargement and pain^Q • Associated with use of OCPs, anabolic steroids and Bartonella^Q • If due to infection, treatment requires parenteral doxycycline^Q (surgery is not required in every case)

HEPATIC CYST

57. Ans. d. Simple cyst: (Ref: Sabiston 19/e p1464; Schwartz 10/e p1288-1289, 9/e p1119; Blumgart 5/e p1052-1054; Shackelford 7/e p1453-1457)

SIMPLE HEPATIC CYST

- Contain serous fluid, do not communicate with the biliary tree, and do not have septations^Q
- Single in 50% cases^Q

Treatment

- Nonsurgical treatment: Aspiration and injection of a sclerosing agent (most frequently ethanol)^Q
- Surgical therapy: Fenestration or unroofing the extrahepatic portion of cyst^Q.

Complication

- MC complication: Intracystic bleeding^Q.

58. Ans. c. Intracystic bleeding is common and deroofting is mandatory

POLYCYSTIC LIVER DISEASE

59. Ans. a. Deroofting of the cyst (Ref: Sabiston 19/e p1464; Schwartz 10/e p1288-1289, 9/e p1119, 8/e p1159; Blumgart 5/e p1054-1062; Shackelford 7/e p1457-1458; Maingot 11/e p776)

Treatment of symptomatic polycystic liver disease is deroofting of the cyst.

POLYCYSTIC LIVER DISEASE

- Autosomal dominant^Q disorder, often found is association with polycystic renal disease
- MC extra-renal manifestation of ADPKD^Q
- Liver cysts are always preceded by kidney cysts^Q.

- Renal function and hepatic cyst load are correlated^Q.
- Associated condition: Berry aneurysm and mitral valve prolapse^Q.

Types

- Type I: Few large cysts (>7-10 cm)
- Type II: Multiple medium cysts (5-7 cm)
- Type III: Diffuse small to medium cysts (<5 cm)

Treatment

- Laparoscopic unroofing^Q for small number of large cysts
- A combination of cyst unroofing + liver resection^Q for reducing liver volume.
- MC complication specific to surgery: Ascites

Complications

- The main complication is bacterial infection^Q of a cyst.
- Other complications: Intracystic bleeding, cholestasis, portal hypertension
- Liver failure has not been observed in these patients.

HEPATOCELLULAR CARCINOMA: RISK FACTORS

60. Ans. d. IBS (Ref: Sabiston 19/e p1453-1454; Schwartz 10/e p1291, 1294-1296, 9/e p1121; Bailey 26/e p1085, 25/e p1099; Blumgart 5/e p1284; Shackelford 7/e p1565-1568)

Conditions Associated with Hepatocellular Carcinoma					
1. Cirrhosis		2. Metabolic diseases		3. Environmental	
Condition	Risk	Condition	Risk	Condition	Risk
• HBV ^Q	High	• Hereditary hemochromatosis ^Q	High	• Thorotrast	Moderate
• HCV ^Q	High	• Hereditary tyrosinemia ^Q	High	• Androgenic steroids ^Q	Moderate
• Alcohol ^Q	High	• Alpha-1 antitrypsin deficiency	Moderate	• Cigarette smoking ^Q	Low to moderate
• Autoimmune chronic active hepatitis	High	• Ataxia telangiectasia ^Q	Moderate	• Aflatoxin ^Q	Moderate
• Cryptogenic cirrhosis	Moderate	• Types 1 and 3 glycogen storage disease	Moderate		
		• Galactosemia ^Q	Moderate		
		• Citrullinemia	Moderate		

• Cirrhosis due to NAFLD ^Q	Moderate	• Hereditary hemorrhagic telangiectasia	Moderate		
• Primary biliary cirrhosis ^Q	Low	• Porphyria cutanea tarda	Moderate		
		• Wilson's disease ^Q	Low		
		• Orotic aciduria	Moderate		
		• Alagille's syndrome ^Q (congenital cholestatic syndrome)	Moderate		

61. Ans. a. HBV

62. Ans. a. Non alcoholic steatohepatitis is a risk factor (Ref: Shackelford 7/e p1567)

- Cirrhosis due to NAFLD (Non-alcoholic fatty liver disease) mainly caused by obesity is a risk factor for HCC.

63. Ans. a. Associated with HBV and HCV, b. Cirrhosis is predisposing factor, c. Fibrolamellar variety is not associated with cirrhosis

64. Ans. c. Cirrhosis

HEPATOCELLULAR CARCINOMA

65. Ans. a. AFP (Ref: Sabiston 19/e p1453-1459; Schwartz 10/e p1294-1296, 9/e p1121; Bailey 26/e p1085-1086, 25/e p1099-1100; Blumgart 5/e p1283-1289; Shackelford 7/e p1567-1576)

HEPATOCELLULAR CARCINOMA

- MC primary liver malignancy is HCC^Q
- HCC represents MC solid organ cancers^Q.
- HCC: MC cause of death in patients with cirrhosis^Q.

- More prevalent in Asia and sub Saharan Africa^Q (high frequency of chronic infection with HBV and HCV^Q)
- 100 folds increase in risk in individuals with HBV infection^Q

- More common in males, 60-90% arise in cirrhotic liver^Q
- Post necrotic cirrhosis has highest risk^Q of developing into HCC
- Alcoholic cirrhosis and Primary biliary cirrhosis has lower risk^Q

- Strong propensity for invasion of vascular channels^Q

Pathology

- Gross Morphology: Hanging, pushing and invasive tumors^Q.
- Histologic patterns: Trabecular, pseudoglandular or acinar, compact pattern and scirrhous pattern

Clinical Features

- MC symptom is abdominal pain >weight loss^Q
- Usually presents at late stage^Q, symptoms at advanced stage are vague
- Non-specific symptoms (anorexia, weight loss) and Hepatomegaly^Q

Paraneoplastic Syndromes in HCC

- Hypercholesterolemia (MC)^Q >hypoglycemia^Q, erythrocytosis, hypercalcemia

- Vascular bruit (25%), GI bleed (10%), tumor rupture (2-5%), jaundice due to biliary obstruction (10%), paraneoplastic syndrome (<5%).

Tumor Markers

- Protein induced by Vitamin K Absence (PIVKA; Des-gamma-Carboxy Prothrombin); glypican-3; AFP fractions^Q

- Lectin fraction-3 of AFP (AFP-L3) is highly specific to HCC and also an indicator of poorly-differentiated histology and unfavorable prognosis^Q
- Serum AFP level is elevated above 20 ng/mL in >70% of patients with HCC.

- The monoclonal antibody HepPar-1 (hepatocyte paraffin-1) identifies a unique antigen on hepatocyte mitochondria and is used to identify hepatocytes or HCC.

Diagnosis

Non-invasive Diagnostic Criteria for HCC

- Focal lesion 1-2 cm: Two imaging techniques with arterial hypervascularization and venous washout^Q.
- Focal lesion >2cm: One imaging technique with arterial hypervascularization and venous washout^Q.
- Techniques to be considered: dynamic CT and MRI.

- Screening is based on regular **ultrasound scanning** in **high risk population**^Q
- Biopsy proof of HCC is **not required**^Q

Treatment

- Complete excision^Q by **partial hepatectomy** or by **total hepatectomy** and **transplant** is the only treatment modality with **curative** potential^Q.

Remember: **Only 15-20% of HCC is resectable, because of**

- Multicentricity, Bilobar involvement^Q
- Portal vein invasion, Lymphatic metastasis^Q

66. Ans. a. USG

67. Ans. a. Not return to normal after hepatic resection

68. Ans. a. HCC, b. Hepatoblastoma

69. Ans. d. AFP (Ref: Sabiston 19/e p1455-1456; Blumgart 5/e p1286-1287; Shackelford 7/e p1567-1576)

Okuda Staging System for HCC (BATA) ^Q		
Clinical parameter	Cut-off value	Points
Serum Bilirubin	<3	0
	>3	1
Serum Albumin	>3	0
	<3	1
Tumor size	<50%	0
	>50%	1
Ascites	Absent	0
	Present	1

Stage I = 0 points; Stage II = 1–2 points; Stage III = 3–4 points

Cancer of the Liver Italian Program (CLIP)

- Components: **PACT** (Portal vein thrombosis, AFP levels, Child-Pugh stage, Tumor extension)^Q
- The CLIP system is applicable to **Hepatitis C-related HCC** cases^Q

Chinese University Prognostic Index

- Components: **BA₃TS** (Bilirubin; A₃: Ascites, AFP, ALP; TNM stage; Symptoms)^Q
- Applicable to **HBV related HCC** in **China**^Q.

Barcelona Clinic Liver Cancer Staging System

- It was developed to allow for the **indication** of the **best therapy** for **each stage of HCC**^Q and is **best suited** for **treatment guidance** and to **select early-stage patients** who could benefit from **curative therapies**.
- It divides patients into four major groups (early, intermediate, advanced and end stage)
- It considers variables related to **tumor stage, liver functional status, physical status and cancer related symptoms**^Q.

70. Ans. c. Hemoperitoneum in 7% patients

CLINICAL FEATURES OF HCC

- **Vascular bruit** (25%)^Q, **GI bleed** (10%), **tumor rupture** (2-5%)^Q, **jaundice due to biliary obstruction** (10%), **paraneoplastic syndrome** (<5%).

71. Ans. a. Hypoglycemia (Ref: Sabiston 19/e p1454)

PARANEOPLASTIC SYNDROMES IN HCC

- **Hypercholesterolemia (MC)**^Q > **hypoglycemia**^Q, erythrocytosis, hypercalcemia

72. Ans. a. MELD

73. Ans. c. Over 80% of tumors are surgically resectable

74. Ans. d. Jaundice

75. Ans. a. AFP increased in 70% cases, b. Resection possible in few cases only

76. Ans. c. AFP is increased in 70% cases

77. Ans. a. Hepatoma

78. Ans. a. AFP

79. Ans. b. Alpha-2 macroglobulin

80. Ans. c. HBV predisposes

81. Ans. d. Nd-YAG laser ablation (Ref: Sabiston 19/e p1456-1459; Schwartz 10/e p1291, 1294-1296, 9/e p1121; Bailey 25/e p1099-1100; Blumgart 5/e p1287-1288; Shackelford 7/e p1571-1577)

TREATMENT OF HCC

- **Hepatic resection** as the **first-line treatment** for cirrhotic patients with small HCC and **preserved liver function** and reserve salvage **transplantation** for **recurrence** or **deterioration of liver function** after hepatic resection^Q.
- Only patients with **normal bilirubin** concentration and **absence of portal hypertension** should be considered for **resection**^Q.
- If not candidate for surgery offer **percutaneous ablation**; patients with more advanced disease (**large** or **multifocal HCC**) **without portal vein invasion** are candidates for **transarterial chemoembolization** if liver function is preserved (the sole palliative approach that has been shown to have a **positive impact** in **survival** is transarterial chemoembolization)^Q.
 - For **patients without cirrhosis** who develop HCC, **resection is the treatment of choice**^Q.
 - For those patients with **Child's class A cirrhosis** with **preserved liver function** and **no portal hypertension**, **resection also is considered**^Q.
 - If **resection is not possible** because of **poor liver function** and the HCC meets the **Milan criteria** (**one nodule <5 cm**, or **two or three nodules all <3 cm**, **no gross vascular invasion** or **extrahepatic spread**), **liver transplantation** is the **treatment of choice**^Q.

Milan criteria (Mazzafero)

- **One nodule <5 cm**
- **Two or three nodules all <3 cm**
- **No gross vascular invasion** or **extrahepatic spread**

Treatment Options for Hepatocellular Carcinoma

1. Surgical: <ul style="list-style-type: none"> • Resection • Orthotopic liver transplantation 	4. Transarterial: <ul style="list-style-type: none"> • Embolization • Chemoembolization • Radiotherapy
2. Ablative: <ul style="list-style-type: none"> • Ethanol injection • Acetic acid injection • Thermal ablation (cryotherapy, radiofrequency ablation, microwave) 	5. Systemic: <ul style="list-style-type: none"> • Chemotherapy • Hormonal • Immunotherapy
3. Combination Transarterial and Ablative	6. External-beam Radiation Therapy

82. Ans. b. Hepatocellular carcinoma (Ref: Sabiston 19/e p1456; Schwartz 10/e p1291-1294-1296, 9/e p1121; Blumgart 5/e p1344; Shackelford 7/e p1573-1574)

HEPATOCELLULAR CARCINOMA

- HCC derive its blood supply from the **hepatic artery**^Q.
- HCC is characterized by being **hyperdense** on the **arterial phase** of contrast imaging, meaning that they have **more arterial perfusion**^Q.
- The **arterial perfusion** of HCC also allows for **treatment** of the lesions **via embolization** of the **feeding artery**^Q.
- **Characteristic of HCC: Propensity to invade the portal vein**^Q.
- The **risk of portal vein invasion** appears to **correlate with tumor size** and **differentiation**^Q.
- The **outcome** of patients with **portal venous invasion** is **worse** than that of patients whose tumor does not invade the portal vein.

83. Ans. b. Hepatocellular carcinoma

This is a **typical case of HCC**, remember **AFP is raised** in about **75% of Africans** and only **30% of patients in US and Europe**.

84. Ans. e. All

85. Ans. a. PUO (Ref: Sabiston 19/e p1454; Schwartz 10/e p1291, 1294-1296, 9/e p1121)

RARE PRESENTATIONS OF HCC

- On **rare occasions**, HCC can present as a **rupture** with the sudden onset of abdominal pain followed by **hypovolemic shock** secondary to **intraperitoneal bleeding**.
- Other rare presentations include **hepatic vein occlusion** (Budd-Chiari syndrome), **obstructive jaundice**, **hemobilia**, or **fever of unknown origin** (PUO)^Q.

86. Ans. b. HCC

87. Ans. c. CA 19-9

88. Ans. a. Sorafenib (Ref: Sabiston 19/e p1458; Blumgart 5/e p1289; Shackelford 7/e p1568)

SORAFENIB

- Sorafenib inhibits **serine/threonine kinase Raf-1**, **vascular endothelial growth factor receptor 1, 2,3**; **platelet-derived growth factor receptor -β**; and **tumorigenic receptor tyrosine kinases (RTKs; RET, Flt-3, and c-Kit)**^Q.
- Sorafenib is **approved** as a standard therapy for **unresectable HCC**^Q.

89. Ans. b. Hepatocellular carcinoma

90. Ans. a. Serial USG + AFP

FIBROLAMELLAR HCC

91. Ans. d. Well demarcated and encapsulated (Ref: Sabiston 19/e p1458; Blumgart 5/e p1227-1228)

FIBROLAMELLAR HCC

- Occurs in **young adults without underlying cirrhosis**^Q
- **Non-encapsulated** but well circumscribed, so **high resectability rate**^Q
- Grows slowly and has **better prognosis**^Q

Pathology

- Well demarcated and **non-encapsulated** and may have a **central fibrotic area**^Q.
- The central scar can make distinguishing this tumor from FNH difficult.
- Composed of **large polygonal tumor cells** embedded in a **fibrous stroma** forming **lamellar structures**

- **Calcification**^Q differentiates FHCC from FNH in 35-55% of FHCC; **heterogeneous enhancement**^Q is also an important imaging finding.

Clinical Features

- Occurs in **younger patients**^Q without a history of cirrhosis.

- FHCC **doesn't produce AFP**^Q
- Associated with **elevated neurotensin**^Q and **Vitamin B₁₂ binding globulin levels**^Q

Treatment

- **Better prognosis** than HCC due to **high resectability rates**, **lack of chronic liver disease**, and a more **indolent course**^Q.
- **Long-term survival** can be expected in about **50-75%** of patients **after complete resection**^Q
- **Recurrence** is **common** and occurs in at least **80%** of patients^Q.
- The presence of **lymph node metastases** predicts a **worse outcome**^Q.

92. Ans. a. Young adults, children

93. Ans. a. Associated with cirrhosis (Ref: Sabiston 19/e p1458)

Characteristic Feature	HCC	Fibrolamellar HCC
Male-to-female ratio	2:1-8:1	1 : 1 ^Q
Median age (year)	55	25 ^Q
Tumor	Invasive	Well circumscribed ^Q
Resectability	<25%	50-75% ^Q
Cirrhosis	90% ^Q	5%
Raised AFP	80% ^Q	5%
HBV positive	65% ^Q	5%

94. Ans. c. AFP level always >1000 pg/ml

LIVER SECONDARIES

95. Ans. a. Ultrasonic waves (Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1123; Bailey 26/e p1084-1085, 25/e p1098-1099; Blumgart 5/e p1290-1305; Shackelford 7/e p1585-1591)

Ultrasonic waves are not described as a method of local ablative therapy for liver secondaries.

Local Ablative therapy for liver secondaries				
Mechanism	Technique	Zone of Necrosis	Advantages	Disadvantages
Freezing	Cryotherapy	3-5 cm	Large zone of necrosis Easily followed by ultrasound	Requires laparotomy Large size probe size
Hyperthermic coagulative necrosis	Radiofrequency or microwave ablation	2 cm	Percutaneous technique	Small size of necrosis
Local injection therapy	Ethanol, acetic acid, chemotherapy, hot saline	3 cm	Simple, inexpensive	Inhomogenous distribution

96. Ans. c. Gallbladder

CA GB leads to **multiple secondaries to liver** in **advanced stage**, and is the most common cause among the given option.

97. Ans. b. Metachronous lesions (Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1293-1294, 9/e p1123; Bailey 26/e p1084-1085, 25/e p1098-1099; Blumgart 5/e p1290-1305; Shackelford 7/e p1585-1589)

COLORECTAL LIVER METASTASIS

- About 20% of these patients are candidates for a potentially curative liver resection with a 5-year survival rates range from 25-58%^Q.
- About two-third of cases recur, but in high-risk situations (four or more tumors, extrahepatic disease), recurrence rates are generally 80% or higher^Q.

- About half of the recurrences are isolated to the liver and a small number of these patients (5%) are candidates for a second liver resection and can expect further 5-year survival rates of 30-40%.

- Resections of extrahepatic metastases that appear to be associated with the best outcome are limited lung metastases, locoregional recurrences of the primary tumor, and portal lymph nodes.

Factors most influential on outcome of Colorectal liver metastasis

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> Size >5 cm^Q Lymph node-positive primary lesion^Q | <ul style="list-style-type: none"> Disease free interval <1 year^Q CEA >200 ng/mL^Q | <ul style="list-style-type: none"> More than one tumor^Q |
|---|---|---|
- Synchronous liver metastasis is associated with poor prognosis

98. Ans. a. Adenocarcinoma of the colon (Ref: www.learningradiology.com)

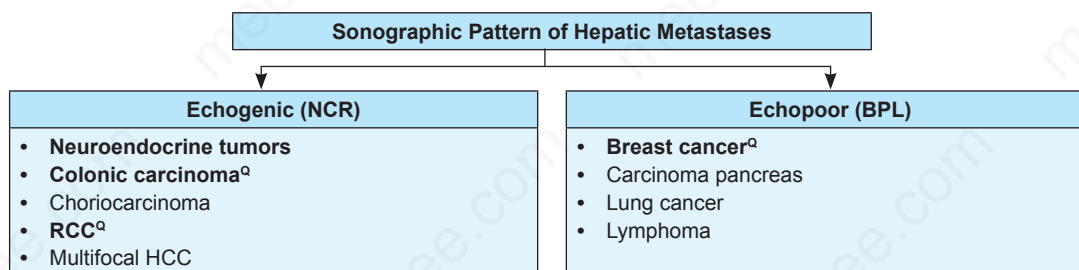
CALCIFIED HEPATIC METASTASES

- Calcified hepatic metastases are most frequently associated with mucin-producing neoplasms such as colon carcinoma^Q or less likely ovarian carcinoma.

99. Ans. a. Breast cancer (Ref: Focal Liver Lesions (Springer) 2006/266)

HEPATIC METASTASES

- Metastases from breast cancer are typically hypoechoic (echopoor)^Q on ultrasonography.
- Metastases from carcinoma colon and RCC are typically hyperechoic (echogenic)^Q.
- Metastases from mucinous adenocarcinoma of colon are typically calcified^Q.



HEPATOBLASTOMA

100. Ans. c. Prognosis is very poor with pulmonary metastasis (Ref: Sabiston 19/e p1459; Schwartz 10/e p1641-1642, 9/e p1450-1451; Blumgart 5/e p1328-1334; Shackelford 7/e p2037-2038)

HEPATOBLASTOMA

- MC primary hepatic tumor of childhood, more common in males^Q.
- Low birth weight may represent a risk factor^Q.
- Most cases are sporadic, also associated with Beckwith-Wiedemann syndrome and FAP^Q
- No evidence of association with HBV or HCV infection or any other chronic viral hepatitis^Q.
- These patients usually do not have cirrhosis or inborn errors of metabolism^Q.

Pathology

- Five histologic subtypes: Fetal, embryonal, mixed mesenchymal, macrotubular, and anaplastic or small cell.

Clinical Features

- Median age of presentation is **18 months**, and almost **all cases occur before 3 years**^Q.
- The **MC presenting sign** is an **asymptomatic abdominal mass**^Q.
- Mild **anemia** and **thrombocytosis**^Q are commonly found at presentation.

- Serum **AFP levels are elevated in 85-90%** of patients and can serve as a useful **marker for therapeutic response**^Q.

Diagnosis

- CT scan reveals a **vascular mass** that is often (50%) **speckled with calcification**^Q.

Treatment

- To **confirm the diagnosis**, an **initial biopsy**^Q is required.

- For **unresectable tumors**, the initial surgical procedure should include a **diagnostic biopsy** and **placement of a vascular access device for chemotherapy**^Q.
- A **second laparotomy** is performed after **four cycles of chemotherapy**, if imaging studies show a good response, and the tumor appears resectable.

- **Neoadjuvant chemotherapy** (cisplatin, 5-fluorouracil, vincristine) followed by **resection**^Q

- 50% of patients with **pulmonary metastases** can be **cured with resection**^Q of the hepatic tumor and **chemotherapy** or resection of the pulmonary metastases^Q.

Prognosis

- Survival appears to be **dependent on complete resection**^Q.
- Long-term survival rates of **60-70%** can be expected with **complete resection**^Q.

101. Ans. b. Common in cirrhosis of liver due to HBV

102. Ans. b. 90% of hepatoblastoma

HEMANGIOENDOTHELIOMA

103. Ans. a. Adult variant is benign (Ref: Sabiston 19/e p1459; Blumgart 5/e p1246)

- Infantile variety is **benign**, adult one is **malignant and highly aggressive**^Q.
-

EPITHELOID HEMANGIOENDOTHELIOMA

- Malignant soft tissue tumor of **endothelial origin**^Q.
- **Infantile variety** is **benign**, adult one is **malignant and highly aggressive**^Q.
- **Female predominance** is related to **vinyl chloride exposure** and **OCPs**^Q.
- In approximately one **half of cases**, **cutaneous hemangiomas** are also present (45%)^Q.

Pathology

- **Factor VIII staining**^Q differentiates it from other nonvascular tumors.
- Liver **parenchymal architecture** is **preserved**^Q.

Diagnosis

- Percutaneous **biopsy**^Q is performed for diagnosis.
- CT scan: Irregular hypodense lesions that may have **hypervascular enhancement**^Q in the periphery following injection of intravenous contrast.

Treatment

- **Total hepatectomy and liver transplantation**^Q (disease is diffuse and multifocal).

104. Ans. a. Most common in males

Epitheloid hemangioendothelioma is more common in females.

CYSTADENOMA AND CYSTADENOCARCINOMA

105. Ans. a. More common in females due to OCP use (Ref: Sabiston 19/e p1464; Schwartz 10/e p1409-1413, 9/e p1119; Blumgart 5/e p1268-1276; Shackelford 7/e p1459)

CYSTADENOMA

- Mostly **intrahepatic**^Q (83%), may occur within the **extrahepatic bile ducts** (13%) or **GB** (0.02%).
- Located in the **right lobe** (50%)^Q
- Cystadenoma with **mesenchymal stroma** occurs exclusively in **young and middle-aged women**^Q

Pathology

- Cyst has a globular external surface with **multiple protruding cysts** and **locules** of various sizes.
- **Fluid** content is **mucinous**.
- Lined with **columnar epithelium** and have **papillary infoldings**.

Clinical Features

- Usually presents as a **large cystic mass**^Q (10-20 cm).
- Mainly affects **women**^Q older than 40 years.
- **Majority of patients** present with a **history of abdominal pain** or **mass**

Diagnosis

- **Ultrasound**: Cystic structure with varying wall thickness, **nodularity**, **septations**, and fluid-filled locules.
- **CECT**: Enhancement of the cyst wall and **septa**^Q
- **ERCP**: Displacement of the intrahepatic bile ducts by the tumor and **no communication** between the **biliary tree** and **cystadenoma**.

Treatment

- **Enucleation** for neoplastic cysts with **no signs of malignancy**^Q
- **Formal hepatic resection** for neoplastic cysts with signs of **malignancy**^Q

106. Ans. a. CT scan is used for diagnosis, b. CA 19-9 is elevated, c. Intrahepatic location (Ref: Sabiston 19/e p1464; Blumgart 5/e p1277-1280; Shackelford 7/e p1459)

BILIARY CYSTADENOCARCINOMA

- **Rare malignancy**, typically **intrahepatic**^Q in location.
- May arise from preexisting **biliary cystadenomas**.
- **Female**^Q to male ratio is 2 : 1; **CA 19-9** is **raised**^Q

Pathology

- The presence of an **associated ovarian-like stroma**^Q in **female** patients appears to signify a **favorable prognosis**
- Tends to be **multilocular**, fluid from the cyst can be blood stained, clear, or bile tinged.
- **Preoperative cyst aspiration** is **not recommended** because there is a risk for **peritoneal tumor seeding**^Q

Clinical Features

- Cystadenocarcinoma tends to be **larger than cystadenoma**, but clinical features are similar

Diagnosis

- **Radiologic findings**: Thick or irregular wall, **peripheral enhancement**, associated **mass**, or **papillary tumor projections**^Q into the cyst cavity.

Treatment

- The only **potentially curative treatment** is **complete removal**, by a **major liver resection with clear margins**^Q.
- **Survival rates** for this disease have been reported in the range of **25% to 100%** at 5 years.

107. Ans. a. Age > 40 years and asymptomatic
Majority of patients of biliary cystadenoma present with a **history of abdominal pain** or **mass**^Q.

LIVER TRANSPLANTATION

108. Ans. a. **Biliary atresia** (Ref: Sabiston 19/e p655-657; Schwartz 10/e p1277, 9/e p295; Bailey 26/e p1427-1429, 25/e p1426-1427; Blumgart 5/e p1662-1663; Shackelford 7/e p1519-1520)

INDICATIONS OF LIVER TRANSPLANTATION

- **MC indication** for LT: Cirrhosis from Hepatitis C (HCV)^Q
 - **2nd MC indication** for LT: **Alcoholic liver disease**^Q
 - MC indication for LT in **children**: **Biliary atresia**^Q
 - MC **metabolic disorder** requiring LT: **Alpha-1 antitrypsin deficiency**^Q
 - MC indication for LT following **acute liver failure**: **Acetaminophen toxicity**^Q
- **Sepsis and sepsis-induced multiple organ failure** are the **MC causes of death** in **liver transplantation**^Q.

109. Ans. c. Colorado (Ref: Sabiston 19/e p655-664; Schwartz 10/e p1277, 9/e p295; Bailey 26/e p1427, 25/e p1408; Blumgart 5/e p1662; Shackelford 7/e p1519)

HISTORY OF LIVER TRANSPLANTATION

- First liver transplantation was done by Starzl^Q in 1963, in Denver, University of Colorado^Q.
- First auxiliary liver transplantation was done by Absolon, in 1964.
- First successful auxiliary liver transplantation was done by Fortner, in 1970.
- First split liver transplantation was done by Pichlmayr^Q, in 1988.
- Pichlmayr did first ex-situ tumor resection of liver and then autotransplantation back into the liver.
- First LDLT to an adult was performed in Kyoto, by Tanaka, using a left hepatic lobe in 1991.

110. Ans. c. Hepatitis A (Ref: Harrison 18/e p2607-2608)

Indications for Liver Transplantation	
Children	Adults
<ul style="list-style-type: none"> • Biliary atresia^Q • Neonatal hepatitis • Congenital hepatic fibrosis • Alagille's syndrome^Q • Byler's disease^Q • Alpha-1 Antitrypsin deficiency^Q 	<ul style="list-style-type: none"> • Primary biliary cirrhosis^Q • Secondary biliary cirrhosis^Q • Primary sclerosing cholangitis^Q • Autoimmune hepatitis • Caroli's disease^Q • Cryptogenic cirrhosis
Inherited Disorders of Metabolism <ul style="list-style-type: none"> • Wilson's disease^Q • Tyrosinemia^Q • Glycogen storage diseases • Lysosomal storage diseases • Protoporphyrria • Crigler-Najjar disease type I^Q • Familial hypercholesterolemia • Primary hyperoxaluria type I • Hemophilia 	<ul style="list-style-type: none"> • Chronic hepatitis with cirrhosis • Hepatic vein thrombosis • Fulminant hepatitis^Q • Alcoholic cirrhosis^Q • Chronic viral hepatitis^Q • Primary hepatocellular malignancies • Hepatic adenomas • Nonalcoholic steatohepatitis • Familial amyloid polyneuropathy^Q

- Alagille's syndrome: Arteriohepatic dysplasia, with paucity of bile ducts, and congenital malformations, including pulmonary stenosis^Q.
- Byler's disease: Intrahepatic cholestasis, progressive liver failure, mental and growth retardation^Q.

Contraindications to Liver Transplantation	
Absolute	Relative
<ul style="list-style-type: none"> • Uncontrolled extrahepatobiliary infection^Q • Active, untreated sepsis^Q • Uncorrectable, life-limiting congenital anomalies^Q • Active substance or alcohol abuse^Q • Advanced cardiopulmonary disease • Extrahepatobiliary malignancy (not including nonmelanoma skin cancer)^Q • Metastatic malignancy to the liver^Q • Cholangiocarcinoma^Q • AIDS^Q • Life-threatening systemic diseases 	<ul style="list-style-type: none"> • Age >70 years^Q • Prior extensive hepatobiliary surgery^Q • Portal vein thrombosis^Q • Renal failure not attributable to liver disease • Previous extrahepatic malignancy (not including nonmelanoma skin cancer)^Q • Severe obesity • Severe malnutrition/wasting • Medical noncompliance • HIV seropositivity with failure to control HIV viremia or CD4 <100/μL^Q • Intrahepatic sepsis • Severe hypoxemia secondary to right-to-left intrapulmonary shunts (PO₂ <50 mmHg)^Q • Severe pulmonary hypertension (mean pulmonary artery pressure >35 mmHg)^Q • Uncontrolled psychiatric disorder

111. Ans. a. > d. Metabolic liver disease > Acute fulminant liver failure for any cause (Ref: Blumgart 5/e p1689-1693)

APOLT is used in acute fulminant liver failure mainly caused by metabolic liver diseases, not in liver failure from any cause.

Types of Liver Transplantation	
Orthotopic LT	• Donor liver implanted in normal anatomic position after recipient hepatectomy ^Q
Heterotopic LT	• Donor liver implanted in alternative site rather than normal anatomic position ^Q

Auxiliary LT	• Native liver remains in situ and whole or partial transplant added ^Q
Piggyback LT	• Orthotopic transplant that preserves recipient IVC ^Q
Split LT	• Cadaveric donor liver divided with a portion transplanted to each of two recipients ^Q
Reduced size LT	<ul style="list-style-type: none"> • Liver can be reduced to a functional unit of appropriate size for the recipient^Q • It can overcome the donor-recipient size discrepancy, but it does not increase the absolute number of grafts
Auxiliary partial orthotopic LT (APOLT)	• Left lobe of recipient liver excised and donor liver occupies vacated space ^Q .
Auxiliary heterotopic LT	• Whole liver or lobe placed in subhepatic space or other nonadjacent area ^Q .

INDICATIONS OF AUXILIARY PARTIAL ORTHOTOPIC LIVER TRANSPLANTATION (APOLT)

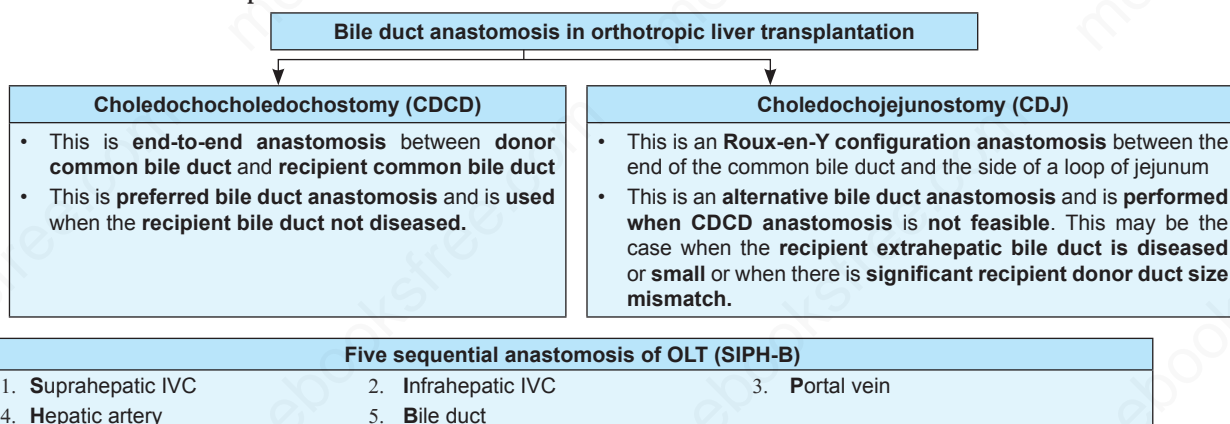
1. Reversible fulminant hepatic failure^Q
2. Small-for-size grafts^Q
3. Non-cirrhotic metabolic liver disease^Q
4. ABO-incompatibility^Q

AUXILIARY PARTIAL ORTHOTOPIC LIVER TRANSPLANTATION (APOLT)

- In fulminant hepatic failure, APOLT provides **temporary support** until the **native liver** recovers and then immunosuppression can be withdrawn.
- APOLT can **compensate** for **enzyme deficiency** in **non-cirrhotic metabolic liver disease** (most commonly **Criggler-Najjar syndrome**) without complete removal of native liver.
- Transplants of **ABO-incompatible grafts** are often unavoidable due to **limited number of potential donor** candidates. A **high incidence** of **early graft failure** with a high rate of **biliary and vascular complications** in ABO-incompatible liver transplantation is reported. The **remnant liver** could **sustain a patient's life** if the anticipated **graft failure** occurred in an ABO-incompatible case.
- In **small-for-size graft**, the **remnant liver** is expected to **support** the function of **implanted graft** during the **early post-op period**. The graft liver expands its function in proportion to volume growth. After the graft liver has grown sufficiently, it can be expected to meet the hepatic functional demands of the recipient.

112. Ans. a. Donor bile with recipient bile duct or Roux en choledochojejunostomy (Ref: Blumgart 5/e p1727-1728)

The preferred method biliary drainage during orthotopic liver transplantation is **direct end-to-end anastomosis** between donor common bile duct and recipient common bile duct.



113. Ans. d. Part of liver segment transplanted into recipient depending upon requirement
114. Ans. b. Increase in number of cells
115. Ans. a. Cholangiocarcinoma

HEPATIC RESECTION

116. Ans. d. Jaundice from extrinsic ductal obstruction (Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1462;)

Jaundice from extrinsic ductal obstruction is not a contraindication to major hepatic resection.

117. Ans. b. 20% (Ref: Blumgart 5/e p1462; Shackelford 7/e p1494)

- Up to 70% to 75% of the **hepatic volume** may be **resected with good recovery** in patients with **relatively normal hepatic parenchyma**^Q (without active hepatitis, cirrhosis, or metabolic defects), as long as the remnant liver has adequate portal venous and hepatic arterial inflow, adequate hepatic venous outflow, and adequate biliary drainage.

118. Ans. b. Not useful in primary hepatoma, c. Can cure secondary carcinoma (Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1344)

HEPATIC ARTERY LIGATION

- Used in management of hemobilia, hepatic artery aneurysm and pseudoaneurysm
- Hepatic artery ligation or embolization is a method of ablation for HCC and liver secondaries, as these tumors are exclusively supplied by hepatic artery but it does not cure the malignancy^Q.
- In each case massive antibiotic therapy should be given post-operatively^Q.

119. Ans. d. The Pringle maneuver (Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1547; Shackelford 7/e p1450-1451)

PRINGLE MANEUVER (TOTAL INFLOW OCCLUSION)

- Total clamping of the hepatic pedicle, by placing an atraumatic clamp across the foramen of Winslow^Q.
- Appropriate-sized vascular clamp or loop snare easily controls hemorrhage from either the portal vein or the hepatic arteries^Q.
- Inflow occlusion durations of up to 30 minutes can be tolerated safely in cirrhotic livers and possibly up to 60 minutes in early disease.
- If prolonged occlusion is required, intermittent clamping can be used with repeated clampings of 10-20 minutes duration, each followed by 5 minutes declamping.

120. Ans. d. Liver Laceration

121. Ans. a. Segment II III IV V VIII (Ref: Blumgart 5/e p1512-1513; Shackelford 7/e p1501-1503)

TRISEGMENTECTOMY

- Right trisegmentectomy or extended right hepatectomy: Complete resection of segment IV with the right liver (removal of segment IV, V, VI, VII, VIII)^Q.
- Left trisegmentectomy or extended left hepatectomy: Complete resection of segments V and VIII with the left liver (removal of segment II, III, IV, V, VIII)^Q.

HEPATIC REGENERATION

122. Ans. c. 4-6 months

LIVER REGENERATION

- Following resection of 2/3rd of the liver, regeneration is complete within 5-6 months.

LIVER TRAUMA

123. Ans. a. Conservative management (Ref: Sabiston 19/e p459-461; Schwartz 10/e p173-174, 1642, 9/e p175; Bailey 26/e p1072-1074, 25/e p1086-1088; Blumgart 5/e p1806-1814; Shackelford 7/e p1479-1487)

In stable patients, conservative management is preferred option.

HEPATIC INJURY

- MC organ injured in blunt abdominal trauma: Spleen > liver^Q
- Mechanisms of blunt hepatic trauma: Compression with direct parenchymal damage and shearing forces, which tear hepatic tissue and disrupt vascular and ligamentous attachments.
- In penetrating abdominal injuries, the liver is the third most common injured organ (28%); after the small bowel (38%); and the colon (31%)^Q.
- Most liver injuries (>85%) involve segments 6, 7 and 8 of the liver^Q.
- Most liver injury bleeding is venous^Q; and therefore low pressure, tamponade is readily performed

Diagnosis

- Liver injuries are often first diagnosed on entering the abdomen in the unstable patient explored for the finding of free fluid on FAST examination^Q.

- Stable patients with suspected hepatic trauma should undergo CECT abdomen^Q.
- Current CT modalities are excellent at providing significant anatomic detail that allows highly accurate characterization of injuries.

- Contrast extravasation visualized as a high-density blush is identified indicating the presence of a pseudoaneurysm or active bleeding external to the liver capsule^Q.
- Beer claw laceration: Multiple Linear laceration of liver OMCECT
- Liver injury grading involves the extent of parenchymal involvement and presence of vascular injury^Q

Management

- **Unstable patients: Immediate laparotomy^Q**
- **Conservative criteria for non-operative management** require
 - Hemodynamically stable patient^Q
 - No peritoneal signs on examination^Q
 - Absence of other major injuries^Q
- **Most treatment failures** occur within the first 24 hours of admission^Q.
- **Failure of non-operative management** is defined as the development of hemodynamic instability or of liver-related multiple transfusions despite angiographic embolization, signs of peritonitis, or abdominal compartment syndrome^Q.

Deep Liver Laceration	• Opening the liver wound and directly approaching the bleeding vessel, a procedure known as tractotomy^Q .
Penetrating Liver Tracts	• Tractotomy or tamponade using a balloon catheter ^Q
Injuries in the vicinity of retrohepatic IVC	• Packing alone , without operative exploration ^Q
Retrohepatic IVC Injury	• Atriocaval shunt (Shrock shunt)^Q

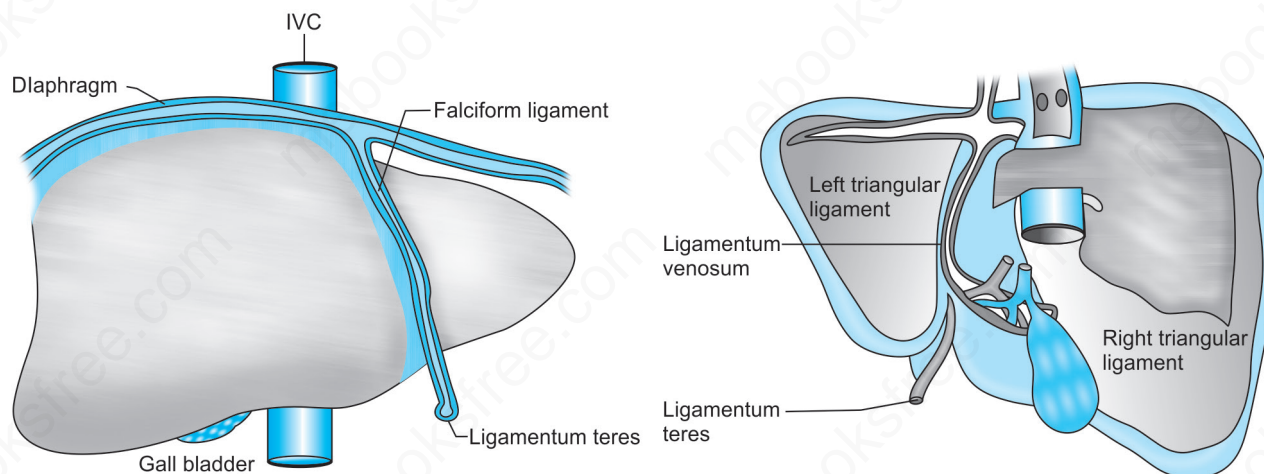
- Liver parenchymal necrosis is the MC complication of severe liver injury in patients who undergo operation^Q.
- Rebleeding is the MC complication of non-operative management^Q.

Classification of Liver Injury (Moore)		
Grade	Type	Operative or CT Scan findings
I	Hematoma Laceration	Subcapsular, <10% of surface area Capsular tear, <1 cm in parenchymal depth
II	Hematoma Laceration	Subcapsular, 10%-50% of surface area Intraparenchymal, <10 cm in diameter 1-3 cm in parenchymal depth, <10 cm in length
III	Hematoma Laceration	Subcapsular, >50% of surface area or expanding; ruptured subcapsular or parenchymal hematoma Intraparenchymal, hematoma >10 cm or expanding >3 cm in parenchymal depth
IV	Laceration	Parenchymal disruption involving 25-75% of the hepatic lobe or 1-3 Couinauds segments in a single lobe
V	Laceration Vascular	Parenchymal disruption involving >75% of the hepatic lobe or >3 Couinauds segments within a single lobe Juxtahepatic venous injuries i.e. retrohepatic vena cava/ central major hepatic veins
VI	Vascular	Hepatic avulsion

124. Ans. a. Hepatic laceration

LIVER ANATOMY

125. Ans. c. Segment II only (Ref: Sabiston 19/e p1413-1417; Schwartz 10/e p1264-1269, 9/e p1095; Bailey 26/e p1065-1067, 25/e p1080-1082; Blumgart 5/e p31-37; Shackelford 7/e p1426-1430)



LOBAR ANATOMY OF THE LIVER

- The liver is divided into **two lobes** by the **main portal fissure** (scissura), known as **Cantlie's line**^Q.
 - Cantlie's line describes a **75° angle** with a **horizontal plane**^Q
 - It extends from the **gallbladder fossa** to the **left side** of the **IVC**^Q.
- Right and left halves** of the liver is **delineated by a plane** through the **MHV** and **IVC**^Q.
- Right portal fissure** divides the right lobe into an **anteromedial** and **posterolateral** sector. **RHV** courses **along this fissure**^Q.
- Right portal fissure** describe an **angle of 40°** with the **transverse plane**^Q.
- Left portal fissure** divides the **left lobe** into an **anterior** and **posterior** sector, **LHV** courses **along this fissure**^Q.
 - In the right lobe:
 - Anteromedial sector**: Segment **V** anteriorly and segment **VIII** posteriorly^Q
 - Posterolateral sector**: Segment **VI** anteriorly and segment **VII** posteriorly^Q
 - In the left lobe:
 - Anterior sector** is divided by the umbilical fissure into **segment IV** and **segment III**^Q
 - Posterior sector** is comprised of **only one segment**, **segment II**^Q
- Umbilical fissure** is **not a scissura**^Q, does not contain a hepatic vein, but **contains the left portal triad**.
- Left scissura** runs **posterior** to the **ligamentum teres** and contains the **LHV**; the left liver is split into an **anterior** (segments **III** and **IV**)^Q and **posterior** (segment **II**- the **only sector** composed of a **single segment**)^Q sector by the left scissura.

126. Ans. c. Venous drainage is mainly by left and middle hepatic vein (Ref: Sabiston 19/e p1413-1419; Schwartz 10/e p1267, 9/e p1095; Bailey 26/e p1066-1067, 25/e p1081-1082; Blumgart 5/e p36; Shackelford 7/e p1431)

CAUDATE LOBE

- Caudate lobe** (segment I), lies between the **left portal vein** and the **IVC** and extends to the **hepatic venous confluence**^Q.

Caudate lobe is unique

- It receives **blood supply** from **both the right and left portal pedicles**^Q
- Bile drain** into **both right and left hepatic duct**^Q
- Venous drainage** is **directly into IVC**^Q

127. Ans. b. Divided into 8 segments (Ref: Gray's 40/1165, 1166, 1178; Sabiston 19/1413-1417; Schwartz 9/1095; Bailey 26/1065-1067, 25/1080-1082; Blumgart 5/31-37; Shackelford 7/1426-1430)

All of the given options are true. If we have to choose one answer, most preferred option is 'liver is divided into 8 segments', because sometimes segment IX is described. Segment IX is a recent subdivision of segment I, and describes that part of the segment that lies posterior to segment VIII.

"Current understanding of the functional anatomy of the liver is based on Couinaud's division of the liver into eight (subsequently nine) functional segments, based upon the distribution of portal venous branches and the location of the hepatic veins in the parenchyma (Couinaud 1957)." — Gray's 40/1165

"Segment IX is a recent subdivision of segment I, and describes that part of the segment that lies posterior to segment VIII." — Gray's 40/1166

Functional Anatomical Divisions of Liver

- Current understanding of the **functional anatomy** of the liver is based on **Couinaud's division** of the liver into **eight (subsequently nine) functional segments**, based upon the distribution of **portal venous branches** and the location of the **hepatic veins** in the parenchyma (Couinaud 1957).
 - Segment IX** is a **recent subdivision** of **segment I**, and describes that **part of the segment** that lies **posterior to segment VIII**^Q.
- The liver is **divided into four portal sectors** by the **four main branches of the portal vein**. These are **right lateral, right medial, left medial and left lateral** (sometimes the term posterior is used in place of lateral and anterior in place of medial).
- The **three main hepatic veins** lie between these sectors as **intersectorial veins**. These **intersectorial planes** are also called **portal fissures** (scissures). The fissures containing portal pedicles are called **hepatic fissures**.
- Each sector is sub-divided into **segments (usually two)** based on their supply by **tertiary divisions of the vascular biliary sheaths**.

Fissures of the liver:

- **Three major fissures**, not visible on the surface, run through the liver parenchyma and **harbor the three main hepatic veins (main, left and right portal fissures)**^Q.
- **Three minor fissures** are visible as **physical clefts of the liver surface (umbilical, venous and fissure of Gans)**^Q.

Major Fissures of the Liver		
Main portal fissure	Left portal fissure	Right portal fissure
<ul style="list-style-type: none"> • Extends from the tip of the GB back to the midpoint of IVC and contains the middle (main) hepatic vein. • Separates liver into right and left hemi-livers. • Segments V and VIII lie to the right and segment IV to the left of the fissure. 	<ul style="list-style-type: none"> • Divides left hemi-liver into medial (anterior) and lateral (posterior) sectors. • Extends from the mid point of the anterior edge of the liver between falciform ligament and left triangular ligament to the point, which marks the confluence of the left and middle hepatic veins. • Contains left hepatic vein • Separates the left anterior and left posterior sectors: segment III lies anteriorly and segment II posteriorly. 	<ul style="list-style-type: none"> • Divides right hemi-liver into lateral (posterior) and medial (anterior) sectors. • Plane of right fissure is the most variable amongst the main fissures and runs approximately diagonally through the gross right lobe from the lateral end of the anterior border to the confluence of the left and middle hepatic veins. • The fissure divides right anterior sector to its left (segments V and VIII) from right posterior sector to its right (segments VI and VII) • Contains right hepatic vein • Right fissure marks the thickest point of liver parenchyma, which is commonly transected during liver resection.

Minor Fissures of the liver		
Umbilical fissure	Venous fissure	Fissure of Gans
<ul style="list-style-type: none"> • Umbilical fissure separates segment III from segment VI within left anterior sector and contains a main branch of left hepatic vein (umbilical fissure vein). • It is marked by attachment of falciform ligament and sometimes covered by a ridge of liver tissue extending between the segments: it is often avascular and can be divided safely with diathermy during a surgical approach. • It contains umbilical portion of left portal vein and the final divisions of left hepatic duct and left hepatic artery branches. 	<ul style="list-style-type: none"> • Venous fissure is a continuation of umbilical fissure on under surface of liver • Contains ligamentum venosum • It lies between caudate lobe and segment IV. • The deeper continuation of this plane is the dorsal fissure. 	<ul style="list-style-type: none"> • Fissure of Gans lies on undersurface of right lobe of liver behind GB fossa. • Contains portal pedicle to right posterior sector

Functional Anatomical Divisions of Liver**Sectors and segments of the liver:**

- The sectors of the liver are made up of between one and three segments: right lateral sector = segments VI and VII; right medial sector = segments V and VIII; left medial sector = segments III and IV (and part of I); left lateral sector = segment II.

- **Segments are numbered in an ante-clockwise spiral centered on the portal vein with the liver viewed from beneath**, starting with segment I up to segment VI, and then back clockwise for the most cranial two segments VII and VIII.

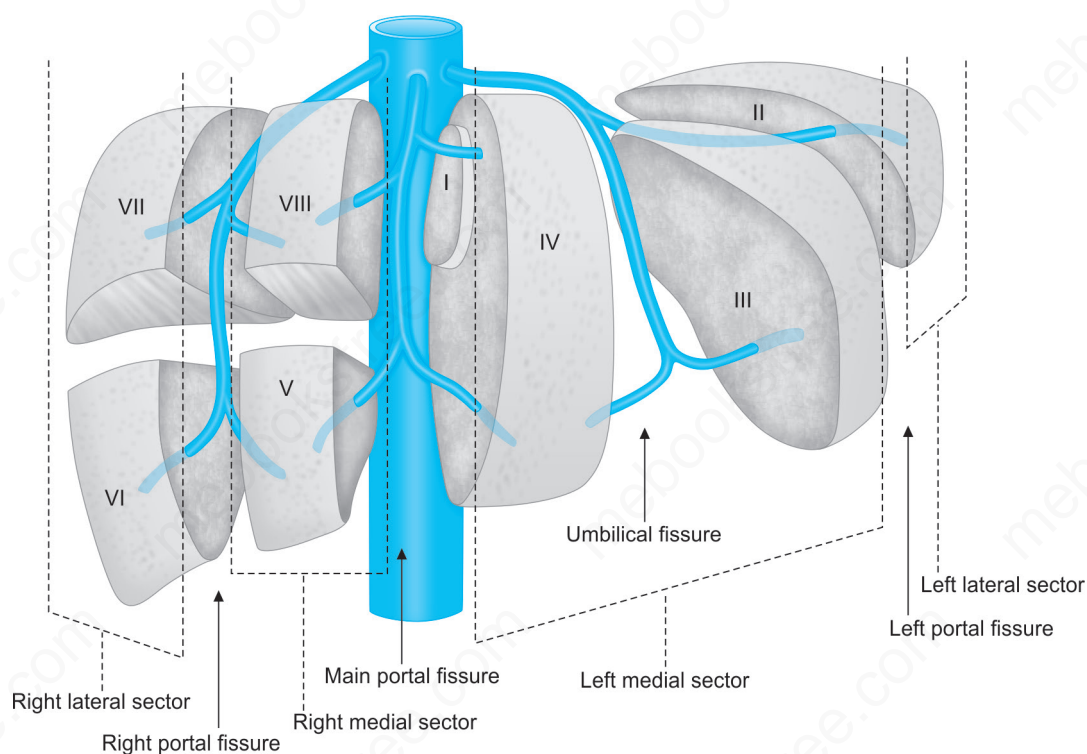
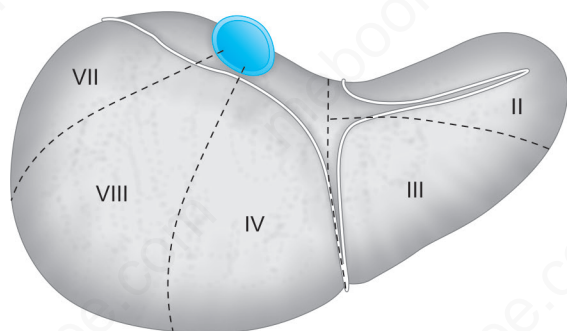
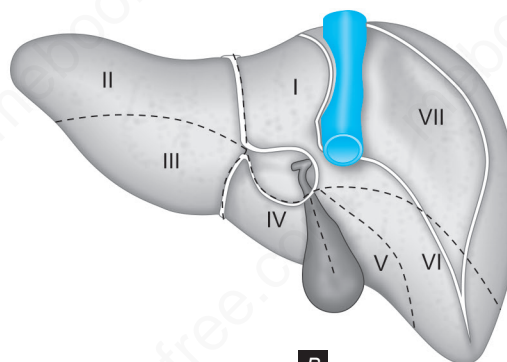


Fig. 17: The fissures and sectors of the liver. (Right lateral = right posterior; right medial = right anterior)

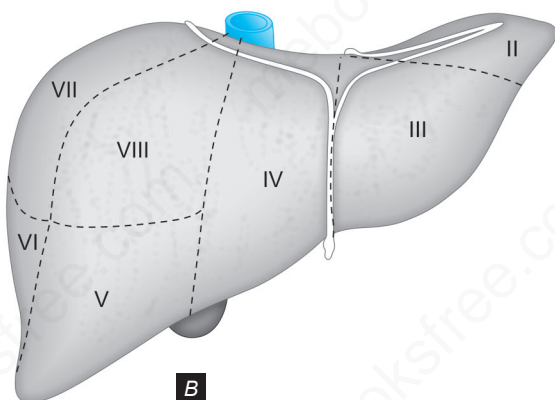
Segmental Nomenclature	
I	Caudate lobe ^a (sometimes subdivided into left and right parts called segment IX)
II	Left lateral superior segment
III	Left lateral inferior segment
IV	Left medial segment or Quadrate lobe ^a
V	Right anterior inferior segment
VI	Right posterior inferior segment
VII	Right posterior superior segment
VIII	Right anterior superior segment



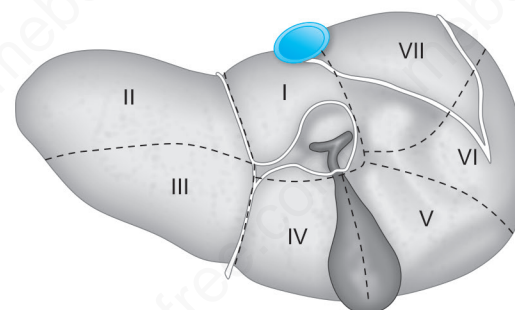
A



B



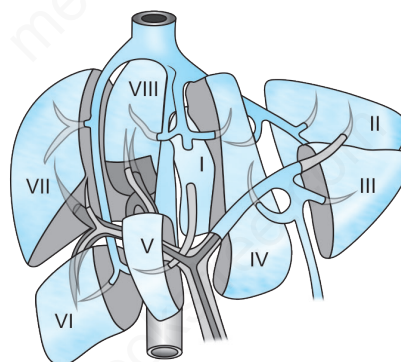
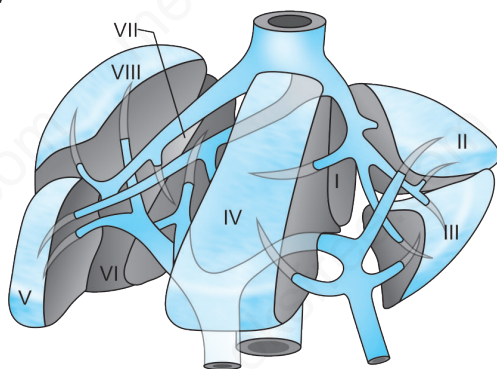
C



D

Figs. 18A to D: Segments of the liver (after Couinaud). (A) superior view; (B) posterior view; (C) anterior view; (D) inferior view.

128. Ans. a. III, IV



- Left medial sector contains segment III and IV
- Left lateral sector contains only one segment, II.

129. Ans. a. Segment I

130. Ans. d. Hepatic vein

PORTAL TRIAD RELATIONS

- CBD laterally^Q
- Portal vein posteriorly^Q
- Hepatic artery medially^Q

Mickey Mouse View: The ultrasound image of hepatic artery, bile duct and portal vein is in a configuration, referred as Mickey Mouse View^Q.

131. Ans. d. Phagocytosis (Ref: Sabiston 19/e p1423; Schwartz 9/e p1110)

KUPFFER CELLS

- Kupffer cells, **derived from the macrophage-monocyte system**^Q
- Are **irregular stellate-shaped cells** that also **line the sinusoids**, insinuating between endothelial cells.
- **Phagocytic**, play a **major role in the trapping of foreign substances**^Q and initiating an inflammatory response.
- **MHC-II antigens** are **expressed on Kupffer cells** but do not confer efficient antigen presentation compared with macrophages elsewhere in the body.

HEPATIC STELLATE CELLS

- **Hepatic stellate cells** (also known as **Ito cells** or **lipocytes**) are cells **high in lipid content** (accounting for their phenotypic identification)^Q
- Found **in the space of Disse**^Q
- Have **dendritic processes** that contact hepatocyte microvilli and also wrap around endothelial cells.
- **Major function: Vitamin A storage and synthesis of extracellular collagen**^Q.

132. Ans. d. Ascends behind the 2nd part of duodenum (Ref: BDC 4th/vol-II/55-57)

Portal vein ascends behind the 1st part, not the 2nd part of duodenum.

Portal Vein		
Part	Position	Structure
Infraduodenal Part	Anterior Posterior	Neck of pancreas IVC
Retroduodenal Part	Anterior Posterior	Duodenum (first part) ^Q Common Bile duct ^Q Gastroduodenal artery ^Q IVC
Supraduodenal Part	Anterior Posterior	Hepatic artery ^Q Bile duct ^Q IVC^Q (separated by epiploic foramen)

133. Ans. c. Segment 2 and 3 (Ref: Sabiston 19/e p1413; Schwartz 10/e p1264-1265, 9/e p1094; Bailey 26/e p1065, 25/e p1080)

FALCIFORM LIGAMENT

- Falciform ligament is the **most obvious external landmark** on the **liver surface**.
- The plane passing through the falciform ligament **passes through** the left lobe
- It **divides the left lobe** into a **medial segment** (segment IV) and **lateral segment** (segment II and III)^Q

134. Ans. b. Caudate lobe drains only left hepatic duct (Ref: Blumgart 5/e p36)

CAUDATE LOBE

- In approx. 80% of the individuals, the **caudate lobe drains** into **both** the **right** and **left** hepatic ducts^Q
- In 15%, the caudate lobe drains **only** into the **left** hepatic duct
- In 5%, the caudate is drained **exclusively** by the **right** hepatic duct.

135. Ans. b. Hepatic vein, d. Portal vein

COUINAUD'S CLASSIFICATION OF LIVER SEGMENTS

- Branching of the **portal vein** and the **hepatic veins** defines these **segments**^Q.
- **Segment I: Caudate lobe**^Q; **Segment IV: Quadrate lobe**^Q

Segmental Nomenclature			
I	Caudate lobe ^Q	V	Right anterior inferior segment
II	Left lateral superior segment	VI	Right posterior inferior segment
III	Left lateral inferior segment	VII	Right posterior superior segment
IV	Left medial segment or Quadrate lobe ^Q	VIII	Right anterior superior segment

136. Ans. b. Quadrate lobe

137. Ans. b. Gallbladder bed to IVC

138. Ans. b. 20%

LIVER

- Weight: 1800 gm in men and 1400 gm in women^Q
- Total blood flow: 1.5 L/min^Q
- Free pressure in a hepatic vein: 1-2 mm Hg^Q
- Liver can store up to maximum of 65 gm of glycogen/kg of liver tissue^Q.
- Account for 4% of body weight, consumes about 28% of total body blood flow and 20% of the total oxygen consumed by the body^Q.
- Expends 20% of the total kilocalories used by the whole body.

Hepatic Vascular Supply	
Hepatic artery	Portal vein
<ul style="list-style-type: none"> • Hepatic artery supplies about 30 mL/min per 100 gm of liver tissue^Q • Approx. 25% of the total blood flow to the liver^Q • Provide 30-50% of the oxygen requirement^Q. • The intrahepatic bile ducts are exclusively perfused by the hepatic arterial blood via the peribiliary plexus^Q. 	<ul style="list-style-type: none"> • Portal vein carries 90 mL/min per 100 gm liver tissue^Q • It carries about 75% of the total blood flow to the liver^Q • It may provide 50% to 70% of the oxygen requirement^Q. • Normal portal pressure is 5-10 mm Hg^Q.

Relationship between Hepatic Artery and Portal vein Blood Flow

- There is an increase in hepatic arterial blood flow after portal flow reduction but the converse is not observed^Q.

139. Ans. a. Segment I

140. Ans. a. Hepatic veins and portal vein

141. Ans. a. Groove for ligamentum teres and gallbladder

Quadrate lobe of liver is present between groove for ligamentum teres and gallbladder.

142. Ans. a. Kidney (Ref: BDC 4th/vol-II/234)

Boundary of Morrison's pouch is formed by kidney.

Boundaries of Morrison's pouch (Hepatorenal pouch)			
Anteriorly	Posteriorly	Superiorly	Inferiorly
<ul style="list-style-type: none"> • Inferior surface of right lobe of the liver • Gall bladder 	<ul style="list-style-type: none"> • Right suprarenal gland • Upper part of right kidney • 2nd part of duodenum • Hepatic flexure of colon • Transverse mesocolon • Part of head of pancreas 	<ul style="list-style-type: none"> • Inferior layer of coronary ligament 	<ul style="list-style-type: none"> • Opens into general peritoneal cavity

143. Ans. a. V, VI, VII and VIII

COUINAUD'S CLASSIFICATION

- Caudate lobe: I^Q
- Left lobe: II, III, IV^Q
- Right lobe: V, VI, VII, VIII^Q

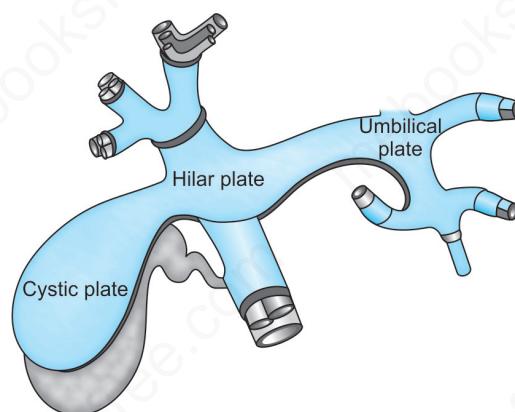
144. Ans. a. Right hepatic vein

- Right hepatic vein is not a component of portal triad
- Liver is not divided into two halves by right hepatic vein.

145. Ans. a. Portal plate (Ref: Sabiston 19/e p1416; Bailey 26/e p1065, 25/e p1080; Blumgart 5/e p41; Shackelford 7/e p1430)

FASCIAL PLATES OF LIVER HILUS

- The fascial plates of the liver hilus, represents a fusion of endoabdominal fascia around the portal structures
- The fascial plate is formed by: cystic, hilar and umbilical plate^Q
- Hepatic veins lack endoabdominal fascial investment^Q.



Fascial plates of liver hilum

146. Ans. b. Segment III

147. Ans. d. 8

LIVER FUNCTION TESTS AND JAUNDICE

148. Ans. b. Peritoneal deposits (Ref: Sabiston 19/e p1481; Schwartz 9/e p1140; Bailey 25/e p1113-1114; Blumgart 5/e p223; Schackelford 7/e p1303)

Peritoneal deposits are not detected by ultrasound. Even CECT can miss the peritoneal deposits.

Best investigation for diagnosis of peritoneal deposits is Diagnostic laparoscopy.

149. Ans. c. It responds well to phenobarbitone (Ref: Harrison 18/e p2534)

Crigler-Najjar Syndromes		
Feature	Type I	Type II
Total serum bilirubin (mg/dL)	18-45 (usually >20) ^a	6-25 (usually 20 ^a)
Routine liver tests	Normal ^a	Normal
Response to Phenobarbital	None ^a	Decreases bilirubin by >25% ^a
Kernicterus	Usual ^a	Rare ^a
Hepatic histology	Normal ^a	Normal ^a
Bile characteristics		
Color	Pale or colorless	Pigmented
Bilirubin fractions	>90% unconjugated ^a	Largest fraction (mean: 57%) monoconjugates ^a
Bilirubin UDP-glucuronosyl transferase activity	Typically absent ^a ; traces in some patients	Markedly reduced: 0-10% of normal
Inheritance (all autosomal)	Recessive ^a	Predominantly recessive (AR>AD) ^a

150. Ans. a. Dubin-Johnson syndrome (Ref: Harrison 17/e p1927)

Causes of Hyperbilirubinemia		
Indirect (unconjugated) Hyperbilirubinemia		Direct (conjugated) Hyperbilirubinemia
Hemolytic disorders		Inherited Conditions:
Inherited	Acquired	1. Dubin-Johnson syndrome ^a
<ul style="list-style-type: none"> Spherocytosis^a Elliptocytosis G-6-PD and pyruvate kinase deficiencies^a Sickle cell anemia^a 	<ul style="list-style-type: none"> Microangiopathic hemolytic anemia PNH^a Immune hemolysis 	2. Rotor's syndrome ^a
<ul style="list-style-type: none"> Ineffective erythropoiesis in cases of vitamin B and iron deficiencies Drugs: Rifampicin, ribavarin^a, probenidic 		
Inherited conditions:		
<ul style="list-style-type: none"> Crigler-Najjar and Gilbert's syndrome^a 		

151. Ans. d. CBD Stones

152. Ans. a. Autosomal dominant, c. Child may alive to adolescence, d. Cause unconjugated hyperbilirubinemia

153. Ans. c. Pruritus, d. Pale stools, e. Icterus (Ref: Harrison 18/e p2530)

OBSTRUCTIVE JAUNDICE

- MC surgical cause of obstructive jaundice is CBD stones^Q
- Characterized by **dark urine, clay colored stools, icterus** and **pruritus**^Q.
- Presence of **urobilinogen** in **urine** rules out obstructive jaundice^Q.
- USG is the **best test** to differentiate medical from surgical jaundice.

Parameter	Hemolytic	Hepatocellular	Obstructive
Blood			
Hemoglobin (12-18 gm/dl)	Decreased	N	N
Unconjugated bilirubin (0.2-0.7 mg/dl)	↑	N or	N
Conjugated bilirubin (0.1-0.3 mg/dl)	N	N or	↑
ALP (3-13 KAU; 30-120 IU/L)	N	↑	N
Aminotransferases	N	N	↑
Cholesterol	N	N	↑
Stool			
Colour of stool	N	N	Pale
Fecal urobilinogen	Increased	Decreased	Trace to absent
Urine			
Bilirubin	Nil		
Urobilinogen	↑	↑	↓

154. Ans. d. Infective hepatitis

155. Ans. d. Ultrasound

156. Ans. a. Jaundice (Ref: Bailey 26/e p1108, 25/e p1149)

COURVOISIER'S LAW

- In obstruction of the **common bile duct** due to a **stone**, distention of gall bladder seldom occurs; the organ usually is **shriveled**^Q.
- If there is no disease in the gall bladder and the **obstruction** is due to **cancer of ampulla, pancreas or bile duct**, then **gall bladder** will be **distended**^Q.

Exceptions to Courvoisier's Law

- **Double impaction of stones**^Q i.e. one in the **cystic duct** and other in **CBD**.
- **Oriental cholangiohepatitis**^Q
- **Pancreatic calculus obstructing the ampulla of Vater**^Q
- **Mucocele** due to **stone** in the **cystic duct**^Q

157. Ans. a. Double impaction

158. Ans. d. Glutamate dehydrogenase (Ref: Harrison 18/e p2529)

ENZYMES ELEVATED IN CHOLESTASIS

- ALP^Q
- 5'-Nucleotidase^Q
- Gamma glutamyl transpeptidase^Q

159. Ans. d. Raised Urinary urobilinogen

160. Ans. a. Vitamin K

161. Ans. a. Jaundice due to **choledocholithiasis** (Ref: Sabiston 19/e p1432-1440; Schwartz 9/e p1113; Bailey 25/e p1088-1091; Blumgart 5/e p1129-1146; Shackelford 7/e p1599-1604; Harrison 18/e p2598)

MISCELLANEOUS

162. Ans. a. Lung (Ref: Shackelford 7/e p1491-1492)

Liver biopsy is done through 8th ICS in midaxillary line to avoid Lung.

LIVER BIOPSY

- **Needle biopsy** has proved to be **most useful**^Q technique to obtain representative liver tissue for analysis.
- For accurate and reliable grading and staging of **chronic viral hepatitis**; a biopsy specimen of **2 cm^Q in length** or longer containing **at least 11 complete portal tracts**^Q is needed.
- Liver biopsy is done through 8th ICS in midaxillary line to avoid Lung^Q.

163. Ans. c. Hydatid liver disease

- **Crumbled egg appearance** in liver is seen in **hydatid disease**^Q.

164. Ans. c. Actinomycosis (Ref: Harrison 18/e p1328)

ACTINOMYCOSIS OF LIVER

- Most commonly, Actinomyces reaches liver through portal vein^Q.
- Liver is gradually replaced by multiple abscesses, typical honey comb liver^Q

Diagnosis

- Needle aspiration: Actinomyces in pus^Q

Treatment

- Antibiotic (Penicillin) is the DOC^Q.

165. Ans. b. Peliosis hepatic (Ref: Shackelford 7/e p1556-1557)

PELIOSIS HEPATITIS

- It is an uncommon disorder characterized by multiple, small, blood-filled sinuses^Q
- Commonly occurs in immunocompromised posttransplant patients, AIDS patients, and patients taking long term steroids^Q.

Etiology

- Drugs causing it are androgens, azathioprine, tamoxifen, estrogen and vitamin A^Q.

Diagnosis

- Radiographically these lesions present as diffuse hypodense areas spread throughout the liver^Q
- CT and MRI show enhancement on early images, which may progress from central to peripheral on delayed imaging.

Treatment

- The treatment for bleeding lesion has been angiographic embolization^Q.

166. Ans. a. Dilatation of thoracoepigastric veins

- IVC obstruction can lead to dilatation of thoracoepigastric veins.

167. Ans. b. Hemochromatosis (Ref: Harrison 18/e p3164)

MANIFESTATION OF HEMOCHROMATOSIS

- | | |
|--|---|
| • Liver: Hepatomegaly, cirrhosis, HCC ^Q | • Skin: Hyperpigmentation ^Q (bronzing of skin) |
| • Pancreas: Diabetes mellitus ^Q | • Joints: Arthropathy ^Q |
| • Heart: CHF, cardiomyopathy ^Q | • Hypogonadism ^Q |

168. Ans. a. Wilson's disease (Ref: Harrison 18/e p3188)

WILSON'S DISEASE

- Wilson's disease is an autosomal recessive^Q inherited disorder of copper metabolism.
- Characterized by excessive deposition of copper in the liver, brain, and other tissues^Q.
- Major physiologic aberration: Excessive absorption of copper from the small intestine and decreased excretion of copper by the liver^Q.
- Defect on chromosome 13q (ATP7B gene)^Q

Pathology

- Kayser-Fleischer rings consist of electron-dense granules rich in copper and sulfur.
- The rings form bilaterally, initially appearing at the superior pole^Q of the cornea, then the inferior pole, and, ultimately, circumferentially.

Clinical Features

- Patients with Wilson's disease usually present with liver disease during the first decade of life or with neuropsychiatric illness during the third decade^Q.

- Any young patient with unexplained chronic or fulminant liver disease should be investigated for Wilson's disease^Q.
- Kayser-Fleischer rings are formed by the deposition of copper in the Descemet's membrane in the limbus of the cornea. The color may range from greenish gold to brown^Q
- When well developed, rings may be readily visible to the naked eye or with an ophthalmoscope
- When not visible to the unaided eye, the rings may be identified using slit-lamp examination or gonioscopy.

- Kayser-Fleischer rings are observed in up to 90% of individuals with symptomatic Wilson's disease and are almost invariably present in those with neurologic manifestations^Q.

Diagnosis

- Approximately 90% of patients have **ceruloplasmin levels** of **<20 mg/dL** (reference range, 20-40 mg/dL).
- The **urinary copper excretion rate** is **>100 mg/d** (reference range, <40 mg/d) in most patients with symptomatic Wilson's disease.
- Hepatic copper concentration** is regarded as the criterion **standard for diagnosis** of Wilson's disease.
- A liver biopsy with sufficient tissue reveals levels of **>250 µg/g of dry weight** even in asymptomatic patients.

Treatment

- Zinc** is the **treatment of choice** for **maintenance therapy** in **Wilson's disease**.

169. Ans. c. Vinyl chloride

- Vinyl chloride** is a **risk factor** for **hepatic angiosarcoma**.

170. Ans. a. MRI (Ref: Shackelford 7/e p1560, 1571)

MRI IN LIVER LESIONS

- MRI has emerged as the **best imaging test** for **liver lesion detection** and **characterization**.
- MRI provides **high lesion-to-liver contrast** and **does not use radiation**.
- Liver-specific contrast media**, such as **mangofodipir trisodium** (taken up by **hepatocytes**) and **ferrumoxides** (taken up by **Kupffer cells**) demonstrate **selective uptake** in the liver and are primarily **used for lesion detection**.
- These two **contrast agents** are also **useful in characterizing specific liver tumors**, such as **FNH, hepatic adenoma** and **HCC**.

Portal Hypertension

MULTIPLE CHOICE QUESTIONS

PORTAL HYPERTENSION

- Which of the following is not associated with left sided portal hypertension? (COMEDK 2006)
 - Secondary to pancreatic inflammation or neoplasm
 - Normal superior mesenteric and portal venous pressure
 - Easily reversed by splenectomy
 - Isolated esophageal varices present
- Normal portal vein pressure is: (COMEDK 2008)
 - <3 mm Hg
 - 3-5 mm Hg
 - 5-10 mm Hg
 - 10-12 mm of Hg
- Which of the following causes minimal porto-hepatic compromise? (JIPMER GIS 2011)
 - Non-selective shunts
 - TIPSS
 - Distal splenorenal shunt
 - Sclerotherapy
- Most common metabolic disturbance of cirrhosis is: (ILBS 2012, JIPMER GIS 2011)
 - Metabolic acidosis
 - Metabolic alkalosis
 - Respiratory acidosis
 - Respiratory alkalosis
- In portocaval anastomosis even if no palpable obstruction is present the criteria to diagnose anastomosis failure is portocaval pressure gradient of more than: (MHSSMCET 2008)
 - 50 cm H₂O
 - 60 cm H₂O
 - 70 cm H₂O
 - 80 cm H₂O
- All are true about hepatopulmonary syndrome except: (JIPMER GIS 2011)
 - Frequency in ESLD is between 8-29%
 - Characterized by hypoxemia and anatomical shunting of blood
 - Only established treatment at present is OLT
 - A pre-operative oxygen tension of <30 mmHg alone is a predictor of disease
- Metabolic complication of cirrhosis are all except: (AIIMS GIS Dec 2006)
 - Hypokalemia
 - Hyponatremia
 - Hypoglycemia
 - Hypoammonemia
- In a patient with compensated liver cirrhosis presented with history of variceal bleed. The treatment of choice in this patient is: (AIIMS June 2002)
 - Propranolol
 - Liver transplantation
 - TIPS (Transjugular intrahepatic portal shunt)
 - Endoscopic sclerotherapy
- Left sided portal hypertension is best treated by: (AIIMS June 2001)
 - Splenectomy
 - Portocaval shunt
 - Lieno-renal shunt
 - Spleno-renal shunt
- Portal hypertension following portal vein thrombosis are guided by: (PGI Dec 2003)
 - ↑ in splenic pulp pressure
 - ↑ in portal vein pressure
 - ↑ in hepatic vein pressure
 - Portal vein Doppler study
- Child criteria include all except: (PGI May 2011)
 - Nutritional status
 - S. Bilirubin
 - S. Creatinine
 - Acid phosphate
 - Ascites
- Child criteria include all except: (PGI Dec 2007, Dec 2006)
 - Nutrition
 - Bilirubin
 - Albumin
 - Encephalopathy
 - Ascites
- Child-Pugh criteria does not include: (Punjab 2010)
 - Encephalopathy
 - ALT
 - Ascites
 - Albumin
- According to Child-Pugh staging, child's B is: (JIPMER GIS 2011)
 - 5-6
 - 7-9
 - 10-11
 - 9-12
- According to Pugh's classification moderate to severe hepatic insufficiency is managed by: (AIIMS Nov 2000)
 - Sclerotherapy
 - Conservative
 - Orthotopic liver transplantation
 - Shunt surgery
- Child-Pugh's criteria does not include: (PGI June 2004)
 - Encephalopathy
 - Ascites
 - Albumin
 - Creatinine
 - ALT
- The Sengstaken tube must maintain a pressure of... to stop bleeding from varices: (JIPMER 87)
 - 20 mm Hg
 - 25 mm Hg
 - 35 mm Hg
 - 45 mm Hg
- Drug induced portal hypertension is seen with: (PGI 78, AIIMS 79)
 - Vitamin A toxicity
 - Methotrexate
 - Aldomet
 - Hydatid cyst

19. In Child's criteria partial encephalopathy, bilirubin 2.5 mg/dl albumin 3 gm/dl, controlled ascites indicates: (PGI 96)
 - a. Grade A
 - b. Grade B
 - c. Grade C
 - d. More information needed
20. Which one of the following is not a treatment of gastroesophageal variceal hemorrhage? (UPSC 2001)
 - a. Sclerotherapy
 - b. Sengstaken tube
 - c. Transjugular intrahepatic portacaval shunt
 - d. Gastric freezing
21. In portal hypertension the sites of portosystemic anastomosis includes: (DPG 2010)
 - a. Lower end of esophagus
 - b. Around umbilicus
 - c. Lower third of rectum and anal canal
 - d. All of the above
22. A 50-years old male presented with history of hematemesis-500 ml of blood and on examination shows BP-90/60, PR-110/min and splenomegaly 5cm below lower costal margin. Most probable diagnosis is: (All India 2012, AIIMS Nov 2006)
 - a. Mallory Weiss tear
 - b. Duodenal ulcer
 - c. Gastritis
 - d. Portal hypertension
23. MELD score doesn't include: (AIIMS GIS Dec 2011, Dec 2006)
 - a. INR
 - b. S. bilirubin
 - c. S. creatinine
 - d. Blood urea
24. A 40-years old male presents with hepatomegaly. On examination his BP was 90/60 mm Hg and heart rate was 120/min. Splenomegaly was also present. The most probable cause of his bleeding is: (AIIMS May 2012)
 - a. Portal hypertension
 - b. Gastric ulcer
 - c. Duodenal ulcer
 - d. Drug induced GI injury
25. Child's Criteria is used in: (DNB 2005, 2001, 2000)
 - a. Pancreatitis
 - b. Cirrhosis
 - c. Multiple myeloma
 - d. AIDS

ESOPHAGEAL VARICES

26. Worm-like filling defect is seen in: (MHCET 2016)(COMEDK 2005)
 - a. Erosive gastritis
 - b. Esophageal varices
 - c. CA esophagus
 - d. Schatzki's ring
27. Which one of the following treatment modalities is not used for management of acute blood loss due to ruptured esophageal varices? (UPSC 2004)
 - a. Endoscopic sclerotherapy
 - b. Endoscopic band ligation
 - c. Octreotide
 - d. Propranolol
28. On barium swallow the grade IV esophageal varices appear as: (AIIMS June 2001)
 - a. Mucosal folds above the carina
 - b. Mucosal folds below the carina
 - c. Mucosal folds at the carina
 - d. A thick band
29. Best test for esophageal varices is: (UPPG 2009)
 - a. CT- scan
 - b. Gastro- esophagoscopy
 - c. Tomography
 - d. Ultrasound
30. The balloons of Sengstaken-Blakemore tube should be temporarily deflated after how many hours to prevent pre-necrosis of the oesophagus? (MHSSMCET 2011)
 - a. 12 hours
 - b. 24 hours
 - c. 36 hours
 - d. 48 hours
31. To stop variceal bleeding pressure in Sengstaken B lackmore tube should be: (MHSSMCET 2007)
 - a. 40 mm
 - b. 50 mm
 - c. 60 mm
 - d. 70 mm

32. Treatment of choice for bleeding esophageal and gastric varices: (MHSSMCET 2007)
 - a. Injection sclerotherapy
 - b. Banding (Endoscopic)
 - c. Shunt surgery
 - d. Devascularization
33. Variceal banding was invented by: (MHSSMCET 2006)
 - a. Borema and Crile
 - b. Stiegmann and Goff
 - c. Sugiura and Futagawa
 - d. Crafoord and Frenckner
34. Which of the following agents is recommended for medical treatment of variceal bleed? (All India 2011)
 - a. Octreotide
 - b. Desmopressin
 - c. Vasopressin
 - d. Nitroglycerine
35. Sclerotherapy failure is defined as: (JIPMER GIS 2011)
 - a. Unresponsiveness to consecutive 2 energy sclerotherapies
 - b. Unresponsiveness to consecutive 3 energy sclerotherapies
 - c. Remnant bleeding even after sclerotherapy for successive 2 hospital admissions
 - d. Failure to heal after a single treatment

GASTRIC VARICES

36. Most common cause of gastric varices is: (AIIMS GIS Dec 2011)
 - a. Splenic vein thrombosis
 - b. Splenectomy
 - c. Cirrhosis
 - d. Mesenteric thrombosis
37. Isolated gastric varices: (AIIMS GIS May 2011)
 - a. Profuse bleeding
 - b. Most commonly due to splenic vein thrombosis
 - c. EUS is better than endoscopy
 - d. Single treatment can lead to eradication
38. Veins involve in stomach varices are: (PGI Dec 2008)
 - a. Coronary vein
 - b. Short gastric vein
 - c. Right gastroepiploic vein
 - d. Left gastroepiploic vein
 - e. Left gastric vein

TIPSS

39. Contraindications of TIPS: (ILBS 2012)
 - a. HPS
 - b. HRS
 - c. VOD
 - d. BCS
40. False about TIPSS: (AIIMS GIS May 2008)
 - a. Shunt thrombosis is more common than stenosis
 - b. Encephalopathy is more common
 - c. Improves ascites and hydrothorax
 - d. Much better control of bleeding than variceal ligation
41. TIPSS means creating anastomosis between which of the following? (WB PG 2015)(MHSSMCET 2009, Karnataka 2006)
 - a. Portal vein and hepatic artery
 - b. Portal vein and IVC
 - c. Portal vein and hepatic vein
 - d. Hepatic vein and hepatic artery
42. TIPSS is a type of: (JIPMER GIS 2011)
 - a. Non-selective shunt
 - b. Selective shunt
 - c. Both selective and non-selective shunt
 - d. Systemic shunt
43. True about TIPS: (PGI June 98)
 - a. It is a type of portocaval shunt
 - b. It is intrahepatic shunt
 - c. Performed by passing endoscopes
 - d. Most suitable for patient going for liver transplant

44. TIPS is used in all except: (AIIMS GIS Dec 2011)
- Refractory ascites
 - BCS
 - Hepatopulmonary syndrome
 - Refractory hepatic hydrothorax

SURGICAL SHUNTS

45. Coronary-Caval fistula is: (ILBS 2011)
- Inokuchi
 - Warren's
 - Eck's fistula
 - Shamik
46. Mesocaval shunt what incision approach is used? (MHSSMCET 2009)
- Midline
 - Paramedian
 - Subcoastal
 - Chevron
47. Which is a non-selective shunt? (AIIMS GIS May 2008)
- DSRS
 - Inokuchi shunt
 - 12 mm interposition shunt
 - 8 mm interposition shunt
48. For bleeding varices of the esophagus, the common operation operations is/are: (AIIMS 81, DNB 89)
- Portocaval shunt
 - Gastrectomy
 - Splenectomy
 - All of the above
49. Prognosis of portocaval shunt depends on all except: (AIIMS Sept 96)
- Serum bilirubin
 - Serum albumin
 - Refractory ascitis
 - Type of shunt
50. Contraindications of portal systemic shunting include: (PGI 88)
- Serum albumin less than 3 mg%
 - Massive ascites
 - Significant jaundice
 - All of the above

51. Denver shunt is used in: (DNB 2012)
- Ascites
 - Dialysis
 - Raised ICT
 - Raised IOP

52. The Le-Veen shunt in ascites is done between peritoneum and: (AIIMS November 2014)
- Cisterna chyli
 - Renal pelvis
 - Superior vena cava
 - Gall bladder

53. The operation that precipitates portosystemic encephalopathy is: (MAHE 2005)
- Splenorenal shunt
 - Sugaira operation
 - Talmal-marison operation
 - Portacaval anastomosis

EXTRA-HEPATIC PORTAL VENOUS OBSTRUCTION

54. A 20-years old male has presented with repeated episodes of hematemesis. There is no history of jaundice or liver decompensation. on examination the significant findings include splenomegaly (8 cms below costal margin), and presence of esophageal varices. There is no ascites or peptic ulceration. The liver function tests are normal. the most likely diagnosis is: (AIIMS Nov 2004)
- Extrahepatic portal venous obstruction
 - Non cirrhotic portal fibrosis
 - Cirrhosis
 - Hepatic venous outflow tract obstruction

55. A 12-years old boy presents with hematemesis, melena and mild splenomegaly. There is no obvious jaundice or ascitis. The most likely diagnosis is: (All India 2011)
- EHPVO
 - NCPF
 - Cirrhosis
 - Malaria with DIC

56. Treatment of choice for extrahepatic portal thrombosis? (MHSSMCET 2009)
- Mesocaval shunt
 - Porto caval shunt
 - Mesorenal shunt
 - Splenorenal shunt

NON-CIRRHOTIC PORTAL FIBROSIS

57. Which of the following is the most common presenting symptom of non-cirrhotic portal hypertension? (All India 2006)
- Chronic liver disease
 - Ascites
 - Upper gastrointestinal bleeding
 - Encephalopathy
58. NCPF is due to: (AIIMS GIS Dec 2010)
- Extrahepatic obstruction
 - Intrahepatic pre-sinusoidal obstruction
 - Intrahepatic sinusoidal obstruction
 - Intrahepatic post-sinusoidal obstruction

BUDD-CHIARI SYNDROME

59. True about Budd-Chiari syndrome is the following except: (MHGPGMET 2005)
- Can occur due to web in IVC
 - Thrombosis of hepatic veins
 - Causes prehepatic portal hypertension
 - Intractable ascites
60. The obstruction of two or more major hepatic veins is seen in: (MHCET 2016)
- Budd-Chiari syndrome
 - Reye's syndrome
 - Rotor syndrome
 - Crigler-Najjar syndrome

61. Budd-Chiari syndrome is due to thrombosis of: (Orissa 2011)
- Infra renal IVC
 - Renal part of IVC
 - Superior mesenteric vein thrombosis
 - Hepatic veins
62. In Budd-Chiari syndrome, the occlusion is at the: (DPG 2010)
- IVC
 - Renal vein
 - Hepatic vein
 - Splenic vein

VENO-OCCLUSIVE DISEASE

63. Veno-occlusive disease in hepatic vein is characterized by: (PGI Dec 2007)
- Central venous congestion
 - Hepatomegaly
 - Portal vein obstruction
 - Budd Chiari syndrome
 - Hepatic fibrosis
64. Veno-occlusive disease is seen in all except: (AIIMS GIS Dec 2011)
- Bone marrow transplant
 - Bush teas
 - Mushroom poisoning
 - Cytosine arabinoside

EXPLANATIONS

PORTAL HYPERTENSION

1. Ans. d. Isolated esophageal varices present (Ref: Sabiston 19/e p1432; Schwartz 10/e p1281, 9/e p1112; Blumgart 5/e p1079-1091; Shackelford 7/e p1597; Harrison 18/e p2598)

Etiology of Portal Hypertension		
Presinusoidal	Sinusoidal	Postsinusoidal
Extrahepatic or sinistral: <ul style="list-style-type: none"> Splenic vein thrombosis^Q Splenomegaly^Q Splenic arteriovenous fistula^Q 	Intrahepatic: Cirrhosis due to- <ul style="list-style-type: none"> HBV, HCV, Alcohol^Q Metabolic abnormality Autoimmune hepatitis Primary biliary cirrhosis and PSC 	Intrahepatic: <ul style="list-style-type: none"> Veno-occlusive disease^Q
Intrahepatic: <ul style="list-style-type: none"> Schistosomiasis^Q Congenital hepatic fibrosis Nodular regenerative hyperplasia Idiopathic portal fibrosis Myeloproliferative disorder^Q Sarcoid and GVHD 		Posthepatic <ul style="list-style-type: none"> Budd-Chiari syndrome^Q Congestive heart failure IVC web^Q Constrictive pericarditis^Q

- MC cause of intrahepatic presinusoidal portal hypertension: Schistosomiasis^Q
- MC cause of sinusoidal portal hypertension: Cirrhosis^Q

LEFT SIDED PORTAL HYPERTENSION

- Portal hypertension due to isolated splenic vein thrombosis^Q is known as left sided portal hypertension or sinistral hypertension^Q.
- Pressure in portal vein and SMV are normal^Q
- There is gastrosplenic venous hypertension leading to formation of gastric varices^Q

Causes

- Pancreatitis (MC)^Q leading to splenic vein thrombosis
- Neoplasm
- Trauma

Treatment

- Splenectomy is the treatment of choice^Q.

2. Ans. c. 5-10 mm Hg (Ref: Sabiston 19/e p1431-1433; Schwartz 10/e p1280-1281, 9/e p1111; Bailey 26/e p1074-1076, 25/e p1088; Blumgart 5/e p1128-1138; Shackelford 7/e p1596; Harrison 18/e p2597)

PORTAL PRESSURE

- Normal portal vein pressure: 5-10 mm Hg^Q
- Normal portal vein pressure: 10-15 cm saline^Q
- Variceal formation occurs when portal pressure is >10 mm Hg^Q.
- Variceal bleeding occurs when portal pressure is >12 mm Hg^Q.

PORTAL HYPERTENSION

- Definition: Portal pressure >10 mm Hg^Q
- MC cause of portal hypertension in United States: Cirrhosis^Q.
- Consequence of both increased portal vascular resistance and increased portal flow^Q.
- Portal hypertension results in splenomegaly with enlarged, tortuous, and even aneurysmal splenic vessels.

- Cruveilhier-Baumgarten murmur^Q: Audible venous hum in caput medusa

- Hyperdynamic portal venous circulation seems to be related to the severity of the liver failure^Q.
- Upper G.I. bleeding is caused by the portal hypertension in about 90% of instances.
- Most bleeding episodes occur during the first 1 to 2 years after identification of varices^Q.
- Colour Doppler is the investigation of choice for evaluation of PHT.

- About **one third** of deaths in patients with known esophageal varices are due to **upper GI bleed**^Q
- A **larger proportion** dies as a result of **liver failure**^Q.

- MC causes of death in cirrhosis patients: **Hepatic failure**^Q
- 2nd MC causes of death in cirrhosis patients: **variceal hemorrhage**^Q

3. Ans. d. Sclerotherapy

4. Ans. b. Metabolic alkalosis (Ref: Sabiston 19/e p1432; Harrison 18/e p2598)

ELECTROLYTE ABNORMALITIES IN CIRRHOSIS

- Hyponatremia, hypokalemia and metabolic alkalosis^Q (↓PNH)

LABORATORY ABNORMALITIES IN CIRRHOSIS

- Cirrhosis is often accompanied by **anemia**, **leukopenia**, and **thrombocytopenia**^Q.
- The **degree of thrombocytopenia** has been found to be a quite **accurate predictor** of the **presence of esophageal varices**^Q.
- **Hypoalbuminemia** and a **prolonged INR** are reliable indices of **chronic** rather than acute liver disease^Q.
- **ALT/AST >2** is **highly suggestive** of **alcohol** as the cause of liver disease^Q.
- Common serum **electrolyte abnormalities** in cirrhosis are **hyponatremia**, **hypokalemia**, and **metabolic alkalosis**^Q.

5. Ans. a. 50 cm H₂O

6. Ans. d. A pre-operative oxygen tension of <30 mm Hg alone is a predictor of disease (Ref: Shackelford 7/e p1606-1608; www.medicalcriteria.com; Sabiston 19/e p585)

- **Severity in HPS** depends upon **liver disease**, **oxygenation defect** and **pulmonary vascular dilatation**^Q.

HEPATOPULMONARY SYNDROME

- Patients with long-standing cirrhosis and portal hypertension are prone to develop HPS.
- Incidence is 4-29% in ESLD
- It is defined as a **triad** of signs: **Liver disease**^Q + increased alveolar-arterial gradients (**hypoxemia**^Q) + evidence of intrapulmonary vascular resistance (**intra-pulmonary vascular dilatation**)^Q.
- **Severity** depends upon **liver disease**, **oxygenation defect** and **pulmonary vascular dilatation**^Q

Clinical Features

- Clinical features are **orthodeoxia**, **platypnea**^Q, and insidious and slow progression of dyspnea, clubbing, distal cyanosis and spider angiomas.

Diagnosis

- **Contrast echocardiography** is the **study of choice** to diagnose **HPS** by demonstrating the presence of **intra-pulmonary vascular dilatations**^Q.

Treatment

- HPS is rare after hepatic resection.
- **Liver transplant reverses HPS** in **most** of the **patients**^Q.

PORTOPULMONARY HYPERTENSION

- PPH is **pulmonary artery hypertension** in **portal hypertension**^Q.
- Portopulmonary Hypertension (PPH) occurs when there is **pulmonary vasoconstriction** and **increased pulmonary artery pressure**^Q.

Clinical Features

- Asymptomatic PPH **predisposes** to **intra-operative cardiac arrhythmias** and **arrest**^Q.

Diagnosis

- Patients with pulmonary artery pressure gradient (PAPG) >25 mm Hg should undergo **right heart catheterization** for further assessment^Q.
- With **right heart catheterization**, a mean **pulmonary artery pressure** of >25 mm Hg with a **capillary wedge pressure** <15 mm Hg **confirm the diagnosis**^Q.

- **PAPG >25 mm Hg**, **pulmonary capillary wedge pressure <15 mm Hg** and **pulmonary vascular resistance >240 dynes/cm⁵** occurring in setting of portal hypertension is **diagnostic of PPH**^Q.

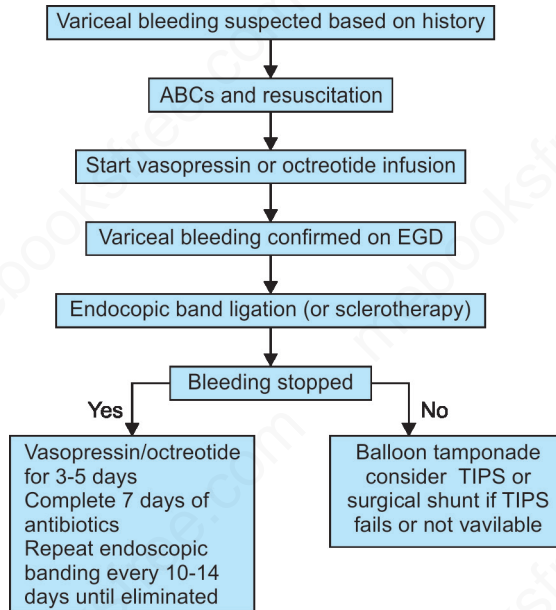
Treatment

- **Best treatment:** combination of **medical therapy** and **liver transplantation**^Q.
- Moderate to severe PPH (PAP >50 mm Hg) is a contraindication for liver transplantation; first consider prostanoid therapy (epoprostenol) to **reduce pulmonary hypertension**^Q.

7. Ans. d. Hypoammonemia

- In cirrhosis, there is hyperammonemia.

8. Ans. d. Endoscopic sclerotherapy (Ref: Sabiston 19/e p1113; Blumgart 5/e p1129-1134; Shackelford 7/e p1597, 1599-1601; Harrison 18/e p2598)

**Management of Variceal Bleeding****VARICEAL BLEEDING**

- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible**
- If varices are found they are treated with either **endoscopic variceal ligation** or **sclerotherapy**^Q.
- EVL is the **treatment of choice** for **variceal bleeding**^Q.

9. Ans. a. Splenectomy

10. Ans. a. ↑ in splenic pulp pressure, b. ↑ in portal vein pressure, d. Portal vein Doppler study

- **Splenic pulp pressure** gives a **measure of the portal vein pressure**; it can be measured by **inserting a needle percutaneously**^Q.
- **Portal vein Doppler study** is the **most useful non-invasive investigation** for assessing **thrombosis** of the **main portal vein branches**^Q.

11. Ans. a. Nutritional status, c. S. Creatinine, d. Acid phosphate (Ref: Sabiston 19/e p1431; Schwartz 10/e p1280, 9/e p1111; Blumgart 5/e p59; Harrison 18/e p2526)

CHILD-TURCOTTE-PUGH (CTP) SCORING SYSTEM

- CTP score is a measure to **assess hepatic function**^Q in many liver diseases.
- It was **initially devised** to **classify patients into risk groups** prior to **undergoing porto-systemic shunt surgeries**^Q.
- It is used to **assess prognosis in cirrhosis**^Q and many liver diseases.

Child-Turcotte-Pugh (CTP) Score			
Variable	1 Point	2 Points	3 Points
Serum albumin (g/dL)	>3.5	2.8-3.5 ^Q	<2.8
Bilirubin (mg/dL)	<2	2-3 ^Q	>3
Prothrombin time (sec above normal) or INR	<4 <1.7	4-6 ^Q 1.7-2.3 ^Q	>6 >2.3
Ascites	None	Controlled ^Q	Uncontrolled
Encephalopathy	None	Controlled ^Q	Uncontrolled

Class A	5-6 points^Q
Class B	7-9 points^Q
Class C	10-15 points^Q

- Major surgeries can be done **only in Class A^Q**
- Only minor surgical procedures can be performed in **Class B^Q**
- No surgical intervention should be done in **Class C (Best treatment is liver transplantation)^Q**.

12. Ans. a. Nutrition

13. Ans. b. ALT

14. Ans. b. 7-9

15. Ans. c. Orthotopic liver transplantation

- Patient of cirrhosis with variceal bleeding or ascites can be controlled by shunt surgery only if he falls in CTP class A or B.
- Moderate to severe grade liver insufficiency can only be managed by liver transplantation^Q.

16. Ans. d. Creatinine, e. ALT

17. Ans. c. 35 mm Hg (Ref: Sabiston 19/e p1433; Schwartz 9/e p1113; Blumgart 5/e p1136-1137; Shackelford 7/e p1600; Harrison 18/e p2598; Bailey 25/e p1089)

- If bleeding does not stop promptly, the **gastric balloon** may be inflated to at least a volume of 300 mL, or the **esophageal balloon** may be inflated to a pressure of 40 mm Hg^Q.

BALLOON TAMPONADE

- Sengstaken and Blakemore designed a **triple-lumen^Q** (esophageal balloon, gastric balloon, and gastric aspiration) tube.

Modifications

- Addition of a **fourth port** above the esophageal balloon for aspiration of oral and esophageal secretions (more effective for bleeding esophageal varices)^Q
 - Development of a **single balloon Linton-Nachlas tube** (for gastric varices)^Q.
 - The airway should be protected by placement of an **endotracheal tube^Q**.
 - The use of **water** or **oily contrast** media to inflate the balloon is **contraindicated^Q**.
 - In the case of Sengstaken–Blakemore tube, the **gastric balloon** is inflated with 50 mL of air^Q and after proper positioning, the gastric balloon inflated with 250 mL of air and plugged snug against the GE junction.
 - If bleeding does not stop promptly, the **gastric balloon** may be inflated to at least a volume of 300 mL, or the **esophageal balloon** may be inflated to a pressure of 40 mm Hg^Q.
 - The Linton-Nachlas tube is inflated with 400-700 mL of air^Q.
- Complication**
- MC complication of balloon tamponade is **aspiration^Q** pneumonia.

18. Ans. a. Vitamin A toxicity (Ref: livertox.nlm.nih.gov)

VITAMIN A INDUCED HEPATOTOXICITY

- Normal doses of vitamin A are **not associated with liver injury** or liver test abnormalities, but **higher doses can be toxic^Q**.

Mechanism of Injury

- **Excess vitamin A is stored in stellate cells^Q** in the liver and accumulation can lead to their **activation** and **hypertrophy**, **excess collagen production**, **fibrosis^Q** and liver injury.
- Serum bilirubin is typically only **mildly elevated^Q**.
- Liver biopsy is **diagnostic^Q**.

19. Ans. d. More information needed, b. Grade B

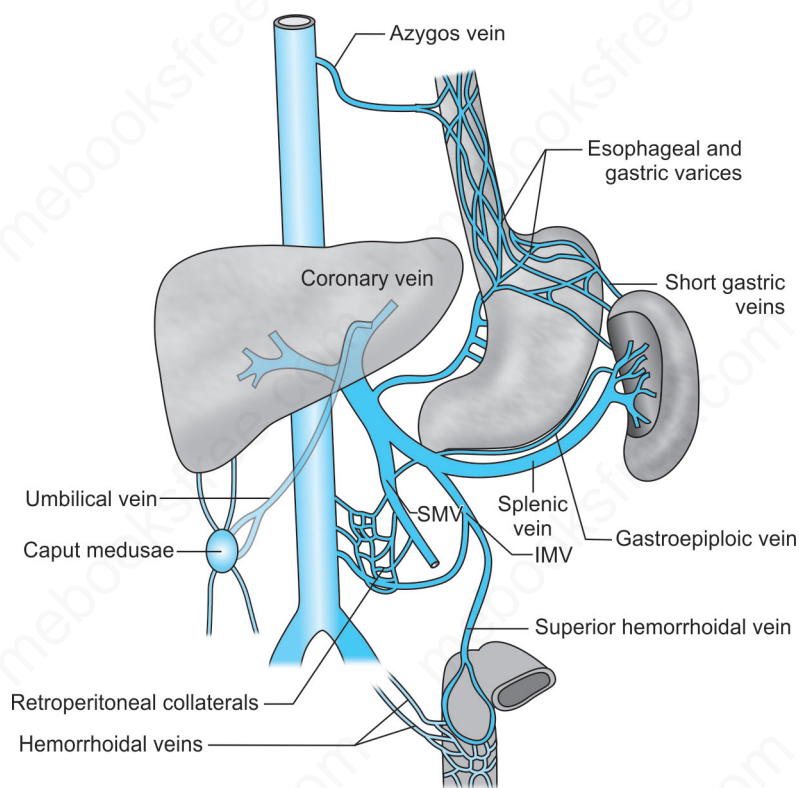
20. Ans. d. Gastric freezing

21. Ans. d. All of the above (Ref: Snell's Clinical Anatomy 7/e p134, 234, 263, 424)

In portal hypertension the sites of portosystemic anastomosis includes lower end of esophagus, around umbilicus, lower third of rectum and anal canal, posterior abdominal wall, bare area of liver.

Porto-Systemic Anastomosis		
Location	Portal Component	Systemic Component
Esophagus (lower end) Esophageal varices	Left gastric vein ^Q	Azygous vein ^Q and accessory hemiazygous vein

Rectum and anal Canal Hemorrhoids	Superior rectal vein^Q	Middle and inferior rectal vein^Q
Umbilicus Caput medusa	Left branch of portal vein (paraumbilical branches)	Superficial (superior and inferior) epigastric veins^Q
Posterior abdominal wall	Colic and omental veins^Q	Retroperitoneal veins^Q of abdominal wall, renal capsule, splenic and hepatic flexure
Bare area of liver	Hepatic venules^Q Right branch of portal vein	Phrenic and intercostal veins Retroperitoneal veins draining into lumbar, azygous and hemiazygous veins
Liver (rarely)	Patent ductus venosus^Q Left branch of portal vein	Inferior vena cava



Portosystemic collateral pathways in portal hypertension

22. Ans. d. Portal hypertension (Ref: Sabiston 19/e p1164)

Common Causes of Upper Gastrointestinal Hemorrhage			
Non-variceal Bleeding	(80%) ^Q	Portal Hypertensive Bleeding	(20%) ^Q
Peptic ulcer disease (MC) ^Q	30-50% ^Q	Gastroesophageal varices ^Q	>90% ^Q
Mallory-Weiss tears	15-20%	Hypertensive portal gastropathy	<5%
Gastritis OR duodenitis	10-15%	Isolated gastric varices	Rare
Esophagitis	5-10%		
Arteriovenous malformations	5%		
Tumors	2%		
Other	5%		

- Splenomegaly and massive bleeding leading to hypotension are in favor of portal hypertension^Q.

23. Ans. d. Blood urea (Ref: Sabiston 19/e p658; Schwartz 10/e p1280, 9/e p297, 1111; Blumgart 5/e p1667; Shackelford 7/e p1525; Harrison 18/e p2526)

MODEL FOR END-STAGE LIVER DISEASE (MELD) SCORE

- MELD score is used to assess the severity of chronic liver disease^Q
 - It was initially developed to predict death within 3 months of surgery in patients that had undergone TIPS.^Q
 - It is calculated by using 3 variables (CBI): S. Creatinine, S. Bilirubin, INR^Q
- MELD score is currently used by United Network for Organ sharing (UNOS) for prioritizing allocation of liver transplant^Q.
- It is 6–40 point scale
 - The relative risk of mortality increases by 14% for each 1 point increase in need score MELD score = $3.8 \log(e)$ (S. bilirubin mg/dL) + $11.2 \log(e)$ (INR) + $9.6 \log(e)$ (S. creatinine mg/dL)

PEDIATRIC END-STAGE LIVER DISEASE (PELD) SCORE

- PELD score utilizes following variables (NABIA)^Q:
- | | | | | |
|------------------------------------|---------------------|---------------------------|---------------------|-------------------------|
| 1. Nutritional status ^Q | 2. Age ^Q | 3. Bilirubin ^Q | 4. INR ^Q | 5. Albumin ^Q |
|------------------------------------|---------------------|---------------------------|---------------------|-------------------------|

MELD score (CBI)	Creatinine, Bilirubin, INR ^Q
PELD score (NABIA)	Nutritional status, Age, Bilirubin, INR, Albumin ^Q

24. Ans. a. Portal hypertension 25. Ans. b. Cirrhosis

ESOPHAGEAL VARICES

26. Ans. b. Esophageal varices (Ref: Wolfgang Radiology 2nd/509)

ESOPHAGEAL VARICES

- On USG:
 - Thickened sinus, interrupted mucosal folds (earliest sign)^Q
 - Tortuous radiolucencies of variable size
 - The “worm-eaten” smooth lobulated filling defects^Q

27. Ans. d. Propranolol (Ref: Sabiston 19/e p1432-1440; Schwartz 9/e p1113; Bailey 26/e p1074-1076, 25/e p1088-1091; Blumgart 5/e p1129-1146; Shackelford 7/e p1599-1604; Harrison 18/e p2598)

ESOPHAGEAL VARICES

- Most significant clinical finding associated with PHT is development of GE varices^Q.
 - Major blood supply to GE varices is anterior branch of left gastric or coronary vein^Q.
 - Variceal bleeding is leading cause of morbidity and mortality associated with PHT^Q
- Approximately 30% of patients with compensated cirrhosis and 60% of patients with decompensated cirrhosis have esophageal varices^Q.
 - One third of all patients with varices experience variceal bleeding^Q.
 - Each episode of bleeding is associated with a 20-30% risk of mortality^Q.
- Seventy percent of patients who survive the initial bleed will experience recurrent variceal hemorrhage within 1 year, if left untreated^Q.
- Prevention of Variceal Bleeding**
- Current measures aimed at preventing variceal bleeding include:
 - Improvement of liver function (abstinence from alcohol)^Q
 - Avoidance of aspirin and NSAIDs^Q
 - Administration of propranolol or nadolol (nonselective beta blockers)^Q
- Beta blockers reduce the index variceal bleed by 45% and reduce bleeding mortality by 50%^Q.
 - 20% of patients do not respond to beta blockers and 20% cannot tolerate beta blockers due to medication side effects^Q.
- Prophylactic endoscopic variceal ligation (EVL) is associated with a lower incidence of first variceal bleed^Q.
 - EVL is recommended for medium to large varices, performed every 1 to 2 weeks^Q until obliteration, followed by endoscopy 1 to 3 months later and surveillance endoscopy every 6 months to monitor for recurrence of varices.

Management of Acute Variceal Bleeding

- Patients should be **admitted to an ICU** for **resuscitation** and management^Q.
- **Blood resuscitation** should be performed to a **hemoglobin level of 8 g/dL**^Q.
- **Over-replacement** of packed **red blood cells** and the overzealous administration of **saline** can lead to both **rebleeding** and **increased mortality**^Q.
- Administration of **FFP** and **platelets** in patients with **severe coagulopathy**^Q.

- **Cirrhotic patients** with variceal bleeding have a **high risk** of developing **bacterial infections**^Q
- **Bacterial infections** are **associated with rebleeding** and a **higher mortality rate**^Q.
- Use of **short-term prophylactic antibiotics** has been shown both to **decrease the rate of bacterial infections** and to **increase survival**^Q.
- **Ceftriaxone 1 g/day IV** is often given^Q.

Pharmacologic therapy for Variceal Hemorrhage

- Pharmacologic therapy can be initiated as soon as the diagnosis of variceal bleeding is made.
- **Vasopressin**, administered IV at a dose of **0.2-0.8 units/min**, is the **most potent vasoconstrictor**, its use is **limited by its large number of side effects**, and it should be administered for **only a short period** to prevent ischemic complications^Q.
- **Somatostatin** and **octreotide** (initial bolus of **50µg IV** followed by continuous infusion of **50µg/h**) also cause **splanchnic vasoconstriction**^Q.
- **Octreotide** is the **preferred pharmacologic agent** for **initial management** of acute variceal bleeding^Q.
- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible** and **EVL** should be performed.
- Combination of **pharmacologic and EVL therapy** **improve initial control of bleeding** and **increase the 5-day hemostasis rate**^Q.
- Even when aggressive pharmacologic and endoscopic therapies are initiated and these treatment options are maximized, **10-20%** of patients with variceal bleeding will **continue to bleed**.
- **Shunt therapy** (**surgical shunts** or **TIPS**) has been shown to **control refractory variceal bleeding** in **>90%** of treated individuals^Q.
- **Shunt surgery** is considered only in patients with **preserved hepatic function** (CTP class A)^Q
- **TIPS** is used in patients with **decompensated liver disease** (CTP class B or C)^Q.

Sengstaken-Blakemore Tube

- Balloon tamponade using will **control refractory variceal bleeding** in **>80%** of patients^Q.
- Its **application is limited** due to complications (**aspiration** and **esophageal perforation**)^Q
- Use of a Sengstaken-Blakemore tube should be **limited to short-term therapy (<24 hours)** in those patients awaiting definitive care^Q.

28. Ans. b. Mucosal folds below the carina (Ref: *Surgical Diseases in Tropical countries/130*)

- **Esophageal varices** presents as **serpiginous filling defects**^Q (arrows) in the esophagus **below** the level of the **carina**^Q.

Radiological Grading of Varices	
Grade I	Straight varices seen only on inspiration
Grade II	Straight varices seen in all phases of respiration
Grade III	Tortuous varices in lower half of esophagus
Grade IV	Tortuous varices in entire esophagus

29. Ans. b. Gastro-esophagscopy

30. Ans. a. 12 hours (Ref: *Bailey 26/e p1074-1075, 25/e p1089*)

- The **balloons** should be **temporarily deflated** after **12 hours**^Q to **prevent pressure necrosis** of the esophagus.

SENGSTAKEN-BLAKEMORE TUBE

- If the **rate of blood loss** prohibits endoscopic evaluation, a Sengstaken-Blakemore tube may be inserted to **provide temporary hemostasis**^Q.
- Once inserted, the **gastric balloon** is inflated with **300 ml of air**^Q and retracted to the gastric fundus, where the varices at the esophagogastric junction are tamponaded by the subsequent inflation of the **esophageal balloon** to a pressure of **40 mmHg**^Q.
- The **two remaining channels** allow **gastric and esophageal aspiration**^Q.
- A **radiograph** is used to **confirm the position of the tube**^Q.
- The **balloons** should be **temporarily deflated** after **12 hours** to **prevent pressure necrosis** of the esophagus^Q.

31. Ans. a. 40 mm

32. Ans. b. Banding (Endoscopic) (Ref: Sabiston 19/e p1434; Schwartz 9/e p1113; Bailey 26/e p1075, 25/e p1089; Blumgart 5/e p1135-1138; Shackelford 7/e p1600-1601; Harrison 18/e p2598)

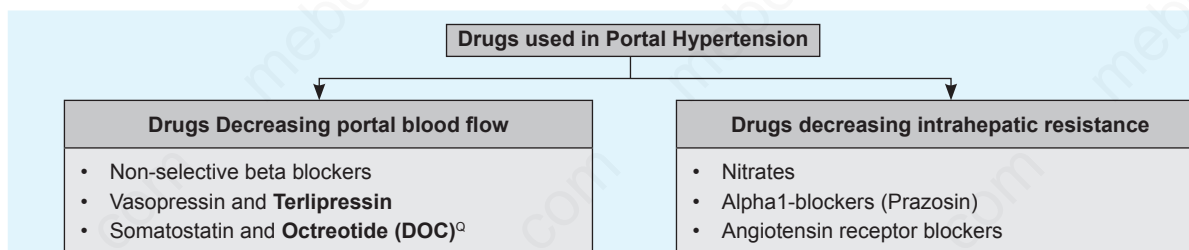
Injection Sclerotherapy	Endoscopic Variceal Ligation
<ul style="list-style-type: none"> Tetradecyl sodium (1-3%), sodium morrhuate (5%), ethanolamine oleate (5%) and 3% phenol are most common sclerosing agents^Q. A combined para and intravariceal technique is used for the management of acute variceal bleeding and a predominantly intravariceal technique for long term management^Q. Variceal eradication is considered the end point of EST^Q Variceal obliteration can be achieved in 80-95% patients with a mean of 4-6.8 sessions^Q. Esophageal stricture^Q is a common complication 	<ul style="list-style-type: none"> For control of acute variceal bleeding EVL has been found to be as effective as EST^Q Technically more difficult than EST^Q in presence of massive bleeding due to reduction in field of view Variceal recurrence rate is higher in EVL since, paraesophageal varices^Q (perforating veins) are not obliterated. Not suitable for small varices (grade I, II) EVL is associated with lesser complications and rebleeding^Q Variceal eradication in fewer sessions but higher recurrence of varices^Q.

33. Ans. b. Stiegmann and Goff (Ref: Bailey 24th/1071)

Van Steigmann and Goff	Endoscopic esophageal variceal ligation ^Q
Crile and Borema	Transesophageal ligation of bleeding esophageal varices ^Q
Sugira and Futagawa	Esophageal transections with paraesophago-gastric devascularization in the treatment of esophageal varices ^Q
Crafoord and Freckner	Endoscopic sclerotherapy ^Q

34. Ans. a. Octreotide (Ref: Harrison 18/e p2598, 17/e p1977)

- Somatostatin and/or its analog octreotide are the agents of choice for medical management of variceal bleed^Q.
- Octreotide and Somatostatin have been found to be effective in achieving hemostasis and preventing early rebleeding^Q.
- Terlipressin is released in sustained and slow manner. It does not share several systemic side effects of vasopressin and may be used to control variceal bleeding^Q.



35. Ans. a. Unresponsiveness to consecutive 2 energy sclerotherapies

- Failure of endoscopic treatment is declared when two sessions fail to control hemorrhage^Q.

GASTRIC VARICES

36. Ans. c. Cirrhosis (Ref: Sabiston 19/e p1222-1223; Schwartz 10/e p1088, 9/e p1113; Blumgart 5/e p1137; Shackelford 7/e p653-654)

- MC cause of gastric varices: Cirrhosis^Q
- MC cause of isolated gastric varices: Splenic vein thrombosis^Q

GASTRIC VARICES

- Classified by Sarin into two types:
 - Gastroesophageal varices
 - Isolated gastric varices.
 - Type 1: Varices located in the fundus of the stomach^Q
 - Type 2: Isolated ectopic varices located anywhere in the stomach^Q.

Pathophysiology

- Gastric varices can develop **secondary to portal hypertension**, in conjunction with esophageal varices, or **secondary to sinistral hypertension** from **splenic vein thrombosis**^Q.
- Isolated gastric varices tend to occur **secondary to splenic vein thrombosis**^Q.

Clinical Features

- The **incidence of bleeding** from gastric varices is **<10%**^Q.

Diagnosis

- USG to **document splenic vein thrombosis** before surgical intervention because gastric varices are most often associated with generalized portal hypertension.
- Gastric varices may be **difficult to recognize endoscopically** even in non-bleeding patients.

- Endoscopic ultrasound** is a **more sensitive diagnostic test** than endoscopy alone for **detection of gastric varices**^Q.

Treatment

- Gastric varices in **splenic vein thrombosis**: **Splenectomy**^Q.
- Gastric varices in the setting of **portal hypertension** should be managed like **esophageal varices**^Q.

- As gastric varices arise in the **submucosa**, a common complication associated with gastric variceal **sclerotherapy** is **ulceration**^Q.

37. Ans. b. Most commonly due to splenic vein thrombosis

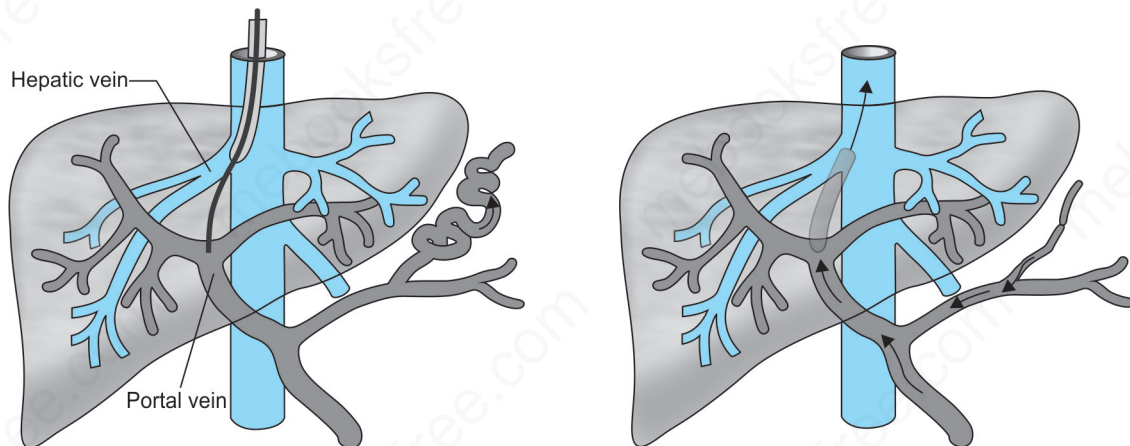
38. Ans. All (Ref: Sabiston 19/e p1222-1223)

GASTRIC VARICES

- Gastric varices can develop **secondary to portal hypertension**, in conjunction with **esophageal varices**^Q, or secondary to **sinistral hypertension** from **splenic vein thrombosis**^Q.
- In generalized portal hypertension, the **increased portal pressure** is **transmitted by the left gastric vein**^Q to **esophageal varices** and by the **short and posterior gastric veins**^Q to the **fundic plexus** and **cardia veins**.
- Isolated gastric varices** tend to occur secondary to **splenic vein thrombosis**.
- Splenic blood flows** retrograde through the **short and posterior gastric veins** into the **varices**, then **hepatopetally** through the **coronary vein**^Q into the **portal vein**.
- Left-to-right retrograde flow** through the **gastroepiploic vein**^Q to the **superior mesenteric vein** can explain the development of **ectopic varices** in the stomach.

TIPSS

39. Ans. a. HPS (Ref: Sabiston 19/e p1437-1440; Schwartz 10/e p347, 9/e p1114; Bailey 26/e p1075-1076, 25/e p1089-1090; Blumgart 5/e p1180-1188; Shackelford 7/e p1602-1603; Harrison 18/e p2599)



TIPS (Transjugular intrahepatic portosystemic shunt)

TRANSJUGULAR INTRAHEPATIC PORTAL-SYSTEMIC SHUNT (TIPSS)

- TIPSS is a **non-selective shunt**, created between **portal** and **hepatic vein**^Q
- TIPSS is **portahepatic** or **intrahepatic shunt**^Q
- **TIPS** in the **acute situations** should be **avoided** in patients requiring **ventilation** and with evidence of **sepsis** and **renal failure**^Q.

Technique of Placement

- Initial venous access is through the **right internal jugular vein** because this is the **shortest** and **most direct path** to catheterize the hepatic veins^Q.
- The **right hepatic vein** is **MC used** because it is the **largest hepatic vein** and usually has the **most favourable orientation**^Q.
- Portal vein is cannulated by **Rosch needle**.
- Portal vein is **localized** by **carbon dioxide wedge hepatic venography**^Q.
- **Portal venogram** before dilating parenchymal tract is **crucial**, provides **confirmation** that **portal vein** has been accessed.

Stent

- The **VIATORR** is a **stent-graft**^Q specifically designed for TIPSS.
- The device has a **2 cm** long bare stent segment that sits in the portal vein; the **covered portion** consists of **three PTFE layers**^Q, one of which is an impermeable film to **prevent bile leak** into the shunt.

Indications of TIPSS

- | | |
|--|---|
| 1. Prevention of rebleeding from varices (MC) ^Q | 5. Refractory hepatic hydrothorax ^Q |
| 2. Acute variceal Bleeding ^Q | 6. Budd-Chiari syndrome ^Q |
| 3. Refractory ascites ^Q | 7. Hepatic veno-occlusive disease ^Q |
| 4. Hepatorenal syndrome ^Q | 8. Portal hypertensive gastropathy ^Q |

Contraindications of TIPSS

Absolute	Relative
1. Right-sided heart failure ^Q	1. Portal vein thrombosis ^Q
2. Polycystic liver disease ^Q	2. Hypervascular liver tumors ^Q
3. Pulmonary hypertension ^Q	3. Encephalopathy ^Q
4. Hepatopulmonary syndrome ^Q	

Complications

- **Encephalopathy (10-20%)**^Q:
 - Usually occurs **within 1 month** of the procedure
 - Relatively easy to manage with **protein restriction** and **lactulose**^Q
 - **Declines after the first 3 months** as the stent develops spontaneous closure
- **Stenosis or thrombosis (5-15%)**^Q:
 - **Half of the stenoses** occur in the **hepatic vein**, and half are due to **intimal hyperplasia** in the parenchymal segment^Q.
 - **Shunt stenosis** is usually secondary to **neointimal hyperplasia** and is **more common than thrombosis**^Q.
 - **Shunt thrombosis** occur in **<30 days**, whereas **stenosis after 30 days**^Q.
 - **Embolization** of the stent to the pulmonary artery
 - Inadvertent puncture of the gallbladder or laceration of the liver capsule
 - Hemobilia, bacteremia with septic shock, intravascular hemolysis
 - Contrast induced oligouric renal failure, worsening hepatic function, right heart failure.

Surveillance

- **Doppler duplex ultrasonography** at 24 hours, 1 month, 3 months, and 6 months after the initial TIPS procedure.

40. Ans. a. Shunt thrombosis is more common than stenosis

- Shunt stenosis is usually secondary to **neointimal hyperplasia** and is **more common than thrombosis**^Q.

41. Ans. c. Portal vein and hepatic vein

42. Ans. a. Non-selective shunt

- TIPSS is a **non-selective shunt**, created between **portal** and **hepatic vein**^Q
- TIPSS is **portahepatic** or **intrahepatic shunt**^Q

43. Ans. b. It is intrahepatic shunt, d. Most suitable for patient going for liver transplant

44. Ans. c. Hepatopulmonary syndrome

SURGICAL SHUNTS

45. Ans. a. Inokuchi (Ref: Sabiston 19/e p1434-1438; Bailey 25/e p1090-1091; Blumgart 5/e p1146-1159; Shackelford 7/e p1603-1604)

INOKUCHI SHUNT

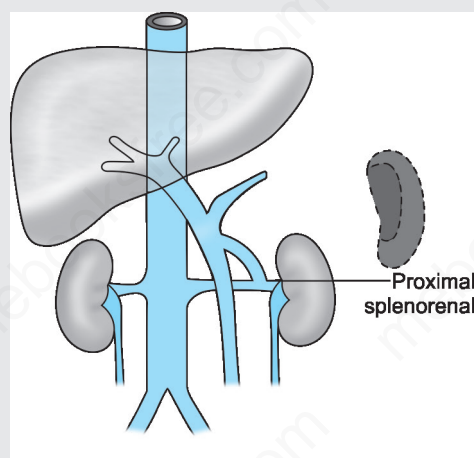
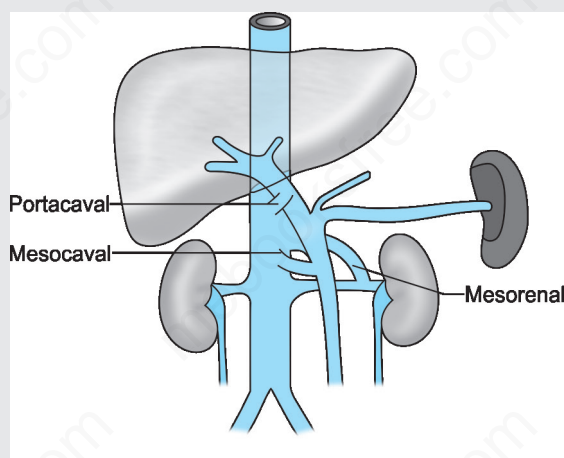
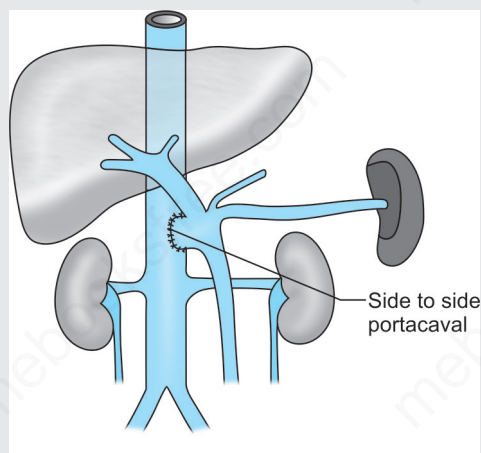
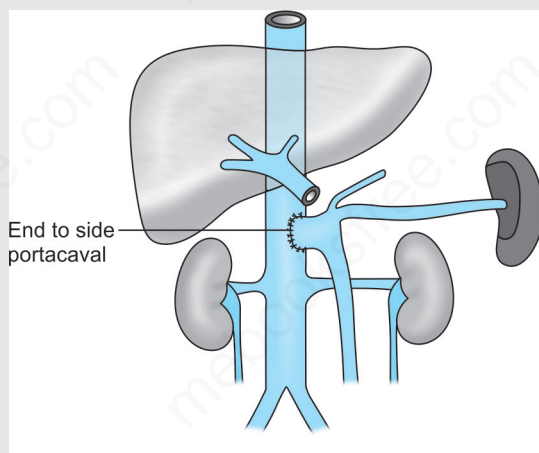
- Interposition of a **vein graft** between the **left gastric** (Coronary) vein and the **IVC**^Q.
- Also known as **coronary-caval fistula**^Q

PORTOSYSTEMIC SHUNTS

- Portosystemic shunts are the **most effective** means of **preventing recurrent hemorrhage**^Q in patients with portal hypertension.

Types of Portosystemic Shunts

Non selective	Selective	Partial
1. Eck fistula ^Q 2. Side-to-side PCS (SSPCS) ^Q 3. Interposition graft (portacaval, mesocaval, mesorenal) ^Q 4. Proximal splenorenal shunt ^Q	1. Distal splenorenal shunt (Warren shunt) ^Q 2. Inokuchi shunt ^Q	1. Diameter of shunt <10 mm ^Q



Non-selective shunts

- In the current era, indications for a **nonselective shunt** would include an **emergency shunt** for **variceal hemorrhage**, an **elective shunt** in the presence of **significant ascites** and treatment of **Budd-Chiari syndrome**^Q.
- Patients in whom a **future liver transplant** is required should be treated with a shunt in which **dissection is performed outside** of the **porta hepatis**.

- Choice (TIPS or shunt) is based on the predicted time to transplantation:
 - TIPS if transplant is delayed <1 year^Q
 - Portosystemic shunt if transplant is delayed >1 year^Q.
- Patients who live in remote locations and those who fail endoscopic and drug therapy receive a selective shunt.

Types of Portosystemic Shunts		
Non selective	Selective	Partial
<ul style="list-style-type: none"> Divert all portal flow away from the liver^Q End-to-side or side-to-side anastomosis >11 mm^Q Side-to-side shunts decompress varices and decompress the obstructed sinusoids, alleviate ascites^Q. 	<ul style="list-style-type: none"> Only decompresses the gastro-esophageal and splenic segments^Q Distal splenorenal shunt (Warren shunt)^Q Inokuchi shunt consists of interposition of a vein graft between the left gastric or coronary vein and IVC^Q 	<ul style="list-style-type: none"> Only diverts part of portal venous flow^Q Side-to-side anastomosis <10 mm^Q diameter

- MC causes of death in:
 - Medically treated patients: Rebleeding^Q
 - Shunted patients: Accelerated hepatic failure^Q
- Rex shunt is an internal jugular vein graft (mesenteric-left portal vein bypass)^Q used in EHPVO^Q.
- Eck's Fistula is an end-to-side portacaval shunt^Q.

46. Ans. a. Midline (Ref: *Mastery of Surgery* 2007/1352; *Atlas of GI Surgery by John L. Cameron* 2007/194)

MESOCAVAL SHUNT

- A mesocaval shunt can be performed through either a bilateral subcostal or midline incision.
- Midline incision is preferred^Q.

47. Ans. c. 12 mm interposition shunt

48. Ans. a. Portocaval shunt

49. Ans. d. Type of shunt

- Prognosis of portacaval shunt depend on Childs criteria (Bilirubin, albumin, ascites, PT, encephalopathy)^Q.

50. Ans. d. All of the above

Porto-systemic shunting is avoided in CTP class C. All the options belong to Class C.

51. Ans. a. Ascites (Ref: *Textbook of Hepatology by Erwin Kuntz*/317)

52. Ans. c. Superior vena cava (Ref: *Bailey 26/e p1077; Textbook of Hepatology by Erwin Kuntz*/317)

The Le-Veen shunt in ascites is done between peritoneum and superior vena cava.

- "The Le-Veen shunt is designed for the relief of ascites due to chronic liver disease. One end of the silastic tube is inserted into the ascites within the peritoneal cavity and the other end is tunneled subcutaneously to the neck, where it is inserted under direct vision into the internal jugular vein and fed into the SVC." - Bailey 26/e p1077

Peritoneovenous Shunt
<ul style="list-style-type: none"> The Le-Veen shunt is designed for the relief of ascites due to chronic liver disease^Q. One end of the silastic tube is inserted into the ascites within the peritoneal cavity and the other end is tunneled subcutaneously to the neck, where it is inserted under direct vision into the internal jugular vein and fed into the SVC^Q.
Mechanism of Action: <ul style="list-style-type: none"> Owing to a one-way valve within the tubing, peritoneal fluid is drawn from the abdomen and drained to the circulation due to the lower pressure in the SVC in comparison with the abdomen during the respiratory cycle^Q.
Complications: <ul style="list-style-type: none"> Occlusion, displacement and infection^Q.
<ul style="list-style-type: none"> In an attempt to prevent the high occlusion rate, a further development was the insertion of a chamber placed over the costal margin to allow digital pressure and evacuation of any debris within the peritoneovenous shunt (Denver shunt)^Q.

53. Ans. d. Portacaval anastomosis (Ref: Blumgart 5/e p1110; Harrison 18/e p2601)

ENCEPHALOPATHY

- Cerebral toxins include ammonia, mercaptans and GABA. **Severity** of encephalopathy **doesn't correlate** with blood ammonia levels.
 - MC cause is **azotemia**^Q; most episodes are **acute**^Q
 - MC setting for the development of encephalopathy is in patients with **cirrhosis** who undergo a **procedural shunt**^Q.
- Only drugs with proven effectiveness:**
 - Neomycin**^Q: A poorly absorbed antibiotic that **suppresses urease containing bacteria**
 - Lactulose**^Q: A nonabsorbable disaccharide that **acidifies colonic contents** and also has **cathartic effects**
- Unproven therapies** include the enteral or parenteral administration of **branch chain amino acids** and the drug **flumazenil**, a selective antagonist of benzodiazepine receptor.

Factors Precipitating Hepatic Encephalopathy	
Nitrogenous causes	Non-nitrogenous causes
<ul style="list-style-type: none"> Uremia/Azotemia (MC)^Q GI bleeding^Q Dehydration Metabolic alkalosis^Q Hypokalemia^Q Constipation^Q Excessive dietary protein^Q Infection^Q 	<ul style="list-style-type: none"> Sedative, benzodiazepines Barbiturates^Q Hypoxia^Q Hypoglycemia^Q Hypothyroidism Anemia

EXTRA-HEPATIC PORTAL VENOUS OBSTRUCTION

54. Ans. b. Non-cirrhotic portal fibrosis (Ref: Blumgart 5/e p1099-1105)

NON CIRRHOTIC PORTAL HYPERTENSION

- Non cirrhotic portal hypertension** encompasses two distinct pathological condition that present with similar clinical features.
 - Non cirrhotic portal fibrosis (NCPF)
 - Extra-Hepatic Portal Venous Obstruction (EHPV^Q)
- Distinction between the two conditions should ideally be made by further investigations as the similarity in presentation makes clinical criteria unreliable.

NCPF	EHPVO
<ul style="list-style-type: none"> NCPF presents in young adults^Q Most commonly during the 2nd and 3rd decade^Q 	<ul style="list-style-type: none"> EHPVO may present in two age groups: <ul style="list-style-type: none"> Children: 1st and 2nd decade due to congenital malformations^Q Adults: 4th and 5th decade due to thrombotic event^Q
Clinical Presentation: <ul style="list-style-type: none"> Gradual onset of symptoms Splenomegaly is about 4 times more common in NCPF than EHPV^Q 	Clinical Presentation: <ul style="list-style-type: none"> Gradual onset in children, where the cause is congenital malformation^Q Acute onset in adults where the cause is a thrombotic event^Q Splenomegaly is 4 times less common in patients with EHPV^Q

55. Ans. a. EHPVO (Ref: Blumgart 5/e p1099-1105)

EXTRA-HEPATIC PORTAL VENOUS OBSTRUCTION (EHPVO)

- EHPVO is a **vascular disorder** of the liver
- Obstruction** of the **extra-hepatic portal vein**^Q with or without involvement of the intra-hepatic portal veins or splenic or SMV.

- MC site of obstruction is at the **confluence of splenic vein and SMV**^Q
- Common cause of portal hypertension** in the **developing countries** (up to 30% of all variceal bleeders) and is **second to cirrhosis** in the **West** (up to 5–10%)^Q.

- EHPVO is MC cause of **upper gastrointestinal bleeding** in **children**^Q.
- Accounts for almost **70% of pediatric patients with portal hypertension**^Q.

Etiology

- Children:** Etiology is **not clear** in majority (Evidence of **umbilical sepsis**, **umbilical catheterization** and **intra-abdominal sepsis** in a small percentage of patients)^Q
- Adults:** **Hypercoagulable** and **prothrombotic states**^Q

Pathology

- Grossly, **original portal vein is difficult to identify** as it is replaced by a cluster of variable-sized vessels arranged haphazardly within a connective tissue support^Q.
- Histology: **Architectural pattern of the liver is preserved.**

Clinical Features

- EHPVO can present in two clinical forms:
 - Recent EHPVO: Abdominal pain, ascites or fever**, may be asymptomatic.
 - Chronic EHPVO: Repeated, well-tolerated bleeding episodes** from esophageal varices.

- Ectopic varices are common (**duodenum, anorectal region, biliary tree and gallbladder**), manifest as **obscure GI bleed, bleeding per rectum or biliary obstruction**^Q

- Moderate splenomegaly**^Q is universal, and may be a presenting feature.
- A proportion of children have **growth retardation**^Q.

Diagnosis

- Liver biopsy** is necessary in a patient with EHPV^Q if the **liver functions are deranged**.
- Doppler US, CT or MRI:** Demonstrates **portal vein obstruction**, presence of **intraluminal thrombus** in the portal vein and/or **portal vein cavernoma**^Q.
- ERCP is the **definitive method for diagnosis of portal biliopathy**^Q.

Treatment

Acute variceal bleeding	Endoscopic variceal ligation ^Q
Gastric varices	Glue injection ^Q
Ectopic varices	Pharmacotherapy, shunts or TIPS ^Q .
Hypercoagulable states	Life-long oral anticoagulants should be administered
Symptomatic hypersplenism	Shunt surgery ^Q Splenectomy without a shunt is not recommended ^Q

- Surgery, shunt or non-shunt**, is indicated in patients with **variceal bleeding who fail endoscopic therapy**^Q.
- Children with EHPV^Q: **Rex shunt (mesenterico-left portal shunt)**^Q

56. Ans. a. > d. Mesocaval shunt > Splenorenal shunt

- Since obstruction is in the portal vein, to bypass the obstruction the shunt should be preferably **Rex shunt (mesenterico-left portal shunt)**^Q or a **mesocaval shunt**.
- Splenorenal shunt is also done in EHPVO but in 50% of patients of EHPVO, **splenic vein is thrombosed**, not available for **splenorenal shunt**^Q.

NON-CIRRHOTIC PORTAL FIBROSIS

57. Ans. c. Upper gastrointestinal bleeding (Ref: Blumgart 5/e p1088)

NON-CIRRHOTIC PORTAL FIBROSIS (NCPF)

- Condition of liver characterized by **widespread fibrosis of liver** (mainly **portal, subcapsular** and rarely perisinusoidal) causing **wide variation in normal architecture**^Q
- There is **no true cirrhosis**^Q.

Etiology

- Chronic ingestion of **Arsenic (As), Copper (Cu) and Vinyl chloride**^Q is incriminated in causing NCPF.

Pathology

- Characterized by **fibrous intimal thickening of the portal vein or its branches**^Q.

- Hallmark of diseases is thrombosis/sclerosis of the portal vein branches**^Q.
- Portal and periportal fibrosis** of varying extent (**No bridging fibrosis**)^Q

- The **portal vein is dilated with sclerosis of the walls**^Q and in autopsy thrombin in the medium or small portal vein branches with accompanying areas of ischemic necrosis.
- Aberrant intrahepatic vessels** may be present in the **periportal area**, which correspond to dilated terminal portal vein branches or venules, termed as **megasinusoids** or **periportal angiomatosis**^Q.

Clinical Features

- **Young age patient** with features of **portal hypertension** with conspicuous **absence of liver cell failure**^Q.
- Patients are usually in **2nd or 3rd decade**^Q.
- Onset of symptoms is **gradual**^Q.
- **MC** presenting symptom is **GI bleed (90% cases)**^Q.
- **Splenomegaly**^Q
- **Jaundice, Hepatomegaly, ascites and stigmata of liver cell failure** are **uncommon**^Q.

Diagnosis

- Site of block is smaller branches (**3rd or 4th order branches**)^Q
 - **Ultrasound shows normal splenoportal axis. Withered tree appearance and periportal fibrosis** is seen in **NCPF**^Q.

58. Ans. b. Intrahepatic pre-sinusoidal obstruction

BUDD-CHIARI SYNDROME

59. Ans. c. Causes prehepatic portal hypertension (Ref: Schwartz 10/e p1283-1284, 9/e p1114; Bailey 26/e p1078, 25/e p1092; Blumgart 5/e p1189-1198; Shackelford 7/e p1547-1548)

BUDD-CHIARI SYNDROME

- BCS is caused by **obstruction of hepatic venous outflow**^Q producing intense congestion of the liver and the clinical manifestations of **ascites, hepatomegaly and abdominal pain**^Q.

Etiology

- **Polycythemia rubra vera** is the **MC etiology**^Q.
- In the **West, thrombosis of the major hepatic veins**^Q is more common.
- In BCS, **all three major hepatic veins** usually are occluded.
- The small hepatic veins that joins the retrohepatic IVC, particularly **veins draining the caudate lobe**, often are **spared**^Q.

- **Membranous obstruction of IVC** is **MC cause of BCS** in **Japan, China, India and South Africa**^Q.

- Infections causing BCS: Filariasis, **amebic liver abscess, aspergillosis, schistosomiasis**, syphilitic gumma and hydatid disease.
- **MC cancers** associated with BCS: **HCC, RCC, adrenal carcinoma and leiomyosarcoma** of the IVC.

Pathology

- **Centrilobular congestion**
- Centrilobular **hepatocyte loss and necrosis, fibrosis and cirrhosis**

Clinical Features

- Symptoms are abdominal **pain**, abdominal **distention**, weakness, anorexia and jaundice^Q
- Signs are **massive ascites, hepatomegaly** (with **hypertrophied caudate lobe**)^Q, wasting, abdominal venous distention, **splenomegaly**, jaundice and edema of thighs, legs and feet.

- **Jaundice and abdominal venous distention** is more common in **hepatic vein occlusion**^Q.
- **Edema of thighs, legs and feet** is seen only in **IVC occlusion**^Q.

- **Striking and progressive weakness** occur as a manifestation in **acute form** but not in chronic forms of BCS^Q.

Diagnosis

- Diagnostic study of greatest value in BCS is **angiographic examination** of the **IVC and hepatic veins** with **pressure measurements**^Q.

- **Patency of IVC** is a **pre-requisite** for side-to-side portacaval shunt (**SSPCS**)^Q.

- Injection of dye in wedged position often shows a characteristic **spider-web pattern** of small hepatic venous **collaterals** connecting to portal or systemic veins.
- **Most, but not all, patients** with **thrombosis** of the **IVC** also have **occlusion** of the **hepatic veins**^Q.

Hepatic Scintiscanning in BCS

- **Decreased and non-homogenous hepatic uptake** of radiocolloid
- **Increased uptake** of radiocolloid by **spleen and bone marrow**
- **Central hot spot** due to healthy and **hypertrophied caudate lobe** is **diagnostic**^Q

Treatment

- Thrombolysis of the **hepatic vein** clot is largely **ineffective** because the **window** for **effective clot lysis** is only **2-3 weeks**, and most patients present after months of symptoms;
- **Side to Side Porto-Caval Shunt: SSPCS** is the **most effective therapy** for BCS caused by **thrombosis** of the **hepatic veins**^Q.

Ideal circumstances for shunt surgery include in BCS

- **Absence** of **cirrhosis** or significant **fibrosis** on biopsy^Q
- **Absence** of a **significant gradient** between the suprahepatic and infrahepatic IVC^Q
- Relatively **short duration** of disease

- In cases of BCS caused by **thrombosis or occlusion** of the IVC, **combined SSPCS and CAS**^Q (Cavoatrial Shunt) has replaced mesoatrial shunt as the **preferred treatment**^Q.

Surgical Treatment of Membranous Obstruction of IVC in BCS

- **Percutaneous transluminal angioplasty and transcatheter membranotomy**^Q (preferred one) when the membrane is **thin**
- When a **long area of stenosis** is involved treatment consists of **direct excision and repair** of the involved area of IVC (endovenotomy) or **cavoatrial bypass graft**^Q.

Indications of OLT in BCS

- **Cirrhosis with progressive liver failure (MC indication)**^Q
- **Failure of a portal-systemic shunt**, usually because of thrombosis^Q
- **Unshuntable portal hypertension** due to thrombosis of the portal vein, splenic vein or SMV^Q
- **Acute fulminant hepatic failure**; rarest indication^Q

60. Ans. c. Budd-Chiari syndrome

61. Ans. d. Hepatic veins

62. Ans. c. Hepatic vein

VENO-OCCLUSIVE DISEASE

63. Ans. b. Hepatomegaly, e. Hepatic fibrosis (Ref: Blumgart 5/e p1189-1198; Shackelford 7/e p1556)

VENO-OCCLUSIVE DISEASE

- It is a group of disorders in which **hepatic venous outflow obstruction** is due to **subendothelial sclerosis** of the **sublobular hepatic veins** and **terminal hepatic venules**^Q within the liver.

Risk Factors

- In the **western hemisphere**, MC cause of VOD is **bone marrow transplantation**^Q.
- **Chemotherapy**: Cytosine arabinoside, Thioguanine, Carmustine, Gemtuzumab ozogamycin^Q
- Long term immunosuppression with **azathioprine** in **renal and liver transplantation**^Q
- Ingestion of **bush teas (pyrrolizidine alkaloids)**^Q from plants of **Crotalaria** and **Scenacio** genera. These plants and plants of **Heliotropium genus**^Q produce liver failure in herbivores.

Pathology

- Involves sinusoids, **central** and **sublobular hepatic vein**^Q
- **Subendothelial sclerosis** of sublobular hepatic vein and sinusoids secondary to endothelial injury
- **Centrilobular necrosis**, ultimately leading to **diffuse fibrosis** and **cirrhosis**^Q

Clinical Features

- The **hallmark** of VOD: **Hyperbilirubinemia**, **tender hepatomegaly** and **fluid retention**^Q.
- The **onset** of VOD usually occurs **within 3 weeks** after bone marrow transplantation, with a **peak 12 days post-transplantation**^Q.
- The **major cause of death** is **bleeding esophageal varices**^Q.

Modified Seattle Criteria

Two or more of the following must be present prior to 20 days after stem cell transplantation for diagnosis of VOD:

- **Bilirubin >2 mg/dL**^Q
- **Tender hepatomegaly**^Q
- **Ascites** and/or **unexplained weight gain** of **>2%** above reference range^Q

Diagnosis

- **Percutaneous needle liver biopsy** is **diagnostic**^Q, showing specific abnormality of extensive occlusion of small hepatic veins in liver.

- **Angiography:** Major hepatic veins and IVC are **normal**, but WHVP is **increased**^Q.
- LFT is abnormal with **elevated plasminogen activator inhibitor-1 (PAI-1)**^Q.

- **PAI-1** has been **implicated** in the **pathology of VOD** and is a **useful marker** in **distinguishing VOD** from the several **other causes** of post-transplant hepatic dysfunction.

Treatment

- Acute stages of VOD: **Withdrawal of causative agent** and **supportive treatment**^Q to damaged liver.

Indications of SSPCS in VOD in acute phases

- Patients who **bleed from esophageal varices**^Q
- Patients who show **no signs of recovery** within 4-8 weeks^Q (e.g. Disappearance of ascites, improvement in LFT, improvement in lesion on percutaneous needle biopsy)

Defibrotide

- **Most promising agent** undergoing trial in the treatment of **severe VOD** is **defibrotide**^Q
- A polydeoxyribonucleotide with adenosine receptor activity which **modulates endothelial cell injury** and **protects sinusoidal endothelium**^Q.

64. Ans. c. Mushroom poisoning.

Gallbladder

MULTIPLE CHOICE QUESTIONS

GALLSTONES: PATHOGENESIS

1. Strong risk factor for developing symptomatic gallstones: (AIIMS GIS May 2008)
 - a. Rapid weight loss
 - b. BMI >30 kg/m² with family history of gallstone
 - c. TPN
 - d. Fat, fertile female of fourty
2. All of the following are essential for formation of gallstones except: (MHSSMCET 2008)
 - a. Bile stasis
 - b. Nucleation
 - c. Crystallization
 - d. Lithogenic bile
3. All of the following are risk factors for gallstones except: (JIPMER GIS 2011)
 - a. Rapid weight loss
 - b. Diabetes mellitus
 - c. Pima Indians
 - d. TPN
4. All are true about pigmented stones except: (AIIMS GIS Dec 2006)
 - a. Seen in cholangiohepatitis
 - b. Secondary CBD stones
 - c. Primary CBD stones
 - d. More common in Asians
5. False about brown pigmented stones: (AIIMS GIS May 2008)
 - a. Associated with disorders of biliary motility and associated bacterial infection
 - b. More common in Caucasians
 - c. Soft and earthy in texture
 - d. High content of cholesterol and calcium palmitate
6. Lithogenic bile has the following properties: (All India 96)
 - a. ↑ Bile and cholesterol ratio
 - b. ↓ Bile and cholesterol ratio
 - c. Equal bile and cholesterol ratio
 - d. ↓ Cholesterol only
7. Stone formation in gallbladder is enhanced by all except: (All India 96)
 - a. Clofibrate therapy
 - b. Ileal resection
 - c. Cholestyramine therapy
 - d. Vagal stimulation
8. Gallbladder stone formation is influenced by all except: (All India 98)
 - a. Clofibrate therapy
 - b. Hyper alimentation
 - c. Primary biliary cirrhosis
 - d. Hypercholesterolemia
9. Incidence of Gallstone is high in: (AIIMS Nov 93)
 - a. Partial hepatectomy
 - b. Ileal resection
 - c. Jejunal resection
 - d. Subtotal gastrectomy
10. True statement about gallstones are all except: (AIIMS Nov 99)
 - a. Lithogenic bile is required for stone formation
 - b. May be associated with carcinoma gallbladder
 - c. Associated with diabetes mellitus
 - d. More common in males between 30–40 years of age
11. Which among the following does not lead to pigment gallstones? (PGI June 99)
 - a. TPN
 - b. Clonorchis sinensis
 - c. Hemolytic anemia
 - d. Alcoholic cirrhosis
12. True about gallstones: (PGI Dec 2002)
 - a. More common in females
 - b. Gallstones, hiatus hernia, CBD stones form Saints triad
 - c. Limey bile precipitated
 - d. Lithotripsy always done
13. All are component of Saint's triad except: (AIIMS Nov 95)
 - a. Renal stones
 - b. Hiatus hernia
 - c. Diverticulosis of colon
 - d. Gallstones
14. Commonest type of Gallstone is: (DNB 2011, Kerala 87)
 - a. Cholesterol stone
 - b. Pigment
 - c. Mixed
 - d. All are equally common
15. Percentage of gallstones which are radio opaque: (NEET 2013, JIPMER 86)
 - a. 10%
 - b. 20%
 - c. 30%
 - d. 40%
16. A Gallstone gets impacted most commonly in which part of common bile duct? (JIPMER 87)
 - a. Supraduodenal
 - b. Retroduodenal
 - c. Ampulla of vater
 - d. Common hepatic duct
17. Incidence of Gallstone disease is increased in: (All India 92)
 - a. Truncal vagotomy
 - b. Jejunal resection
 - c. Ileal resection
 - d. Right hemicolectomy
18. Gallstones do not contain: (Recent Question 2014)
 - a. Oxalate
 - b. Cholesterol
 - c. Phosphate
 - d. Carbonate
19. Cholesterol gallstones are due to: (JIPMER 95)
 - a. Decreased motility of gallbladder
 - b. Hyposecretion of bile salts
 - c. Hypercholesterolemia
 - d. All of the above
20. True color of cholesterol stone is: (DNB 2012)
 - a. Black
 - b. Brown
 - c. Dark Yellow
 - d. Pale Yellow

21. The predominant constituent of the pale yellow gallstones in the gallbladder is: (COMEDK 2007)

- a. Mucin glycoprotein
- b. Calcium carbonate
- c. Cholesterol
- d. Calcium phosphate

22. Most common type of gallstone in India is: (MCI March 2009)

- a. Cholesterol
- b. Pigment
- c. Mixed
- d. Both A and C

23. Calculous cholecystitis is associated with all of the following except: (MCI March 2005)

- a. Oral contraceptives
- b. Estrogen
- c. Obesity
- d. Diabetes

24. Which is true about gallstones? (Punjab 2010)

- a. Pigment stones are most common
- b. Bacterial nidus of infection may be seen
- c. Even if asymptomatic gallbladder should be removed
- d. They are mostly solitary

25. By definition pigment stone contain how much % of cholesterol? (MHSSMCET 2005)

- a. <10
- b. <20
- c. <30
- d. <60

26. 80% of gall stones contain: (Recent Question 2015)

- a. Bile pigments
- b. Cholesterol
- c. Calcium salts
- d. Phospholipids

GALLSTONES INVESTIGATIONS

27. Investigation of choice in acute cholecystitis: (PGI Dec 2005)

- a. OCG
- b. HIDA scan
- c. USG
- d. CT

28. Mercedes benz sign or Seagull sign is seen in: (Recent Question 2015 MHSSMCET 2006)

- a. Gallstones
- b. Renal stones
- c. CBD stones
- d. Hydatid cyst

29. Which is not required for visualization of gallbladder in oral cholecystography? (AIIMS Nov 95, All India 97)

- a. Functioning liver
- b. Motor mechanisms of gallbladder
- c. Patency of cystic duct
- d. Ability to absorb water

30. Best investigative modality for gallbladder: (PGI 85)

- a. OCG
- b. PTC
- c. Ultrasound
- d. Intravenous cholangiogram

31. Graham Cole test refers to: (AIIMS 81, AP 89)

- a. Oral cholecystography
- b. Intravenous cholangiography
- c. Pre-operative cholangiography
- d. Post-operative cholangiography
- e. Tomography

32. Initial investigation of choice for biliary obstruction:

- a. CT Abdomen
- b. ERCP
- c. MRCP
- d. USG

33. The substance used in OCG is: (PGI 87, Kerala 88)

- a. Iopanoic acid
- b. Sodium diatrizoate
- c. Meglumine iodothalamate
- d. Biligriffin
- e. Dianasil

34. Dye used in IV cholangiography is: (PGI 86)

- a. Dianasil
- b. Conray
- c. Biligriffin
- d. Myodil

35. Investigation of choice in suspected gallbladder stone is:

- a. Ultrasound
- b. X-ray

c. Barium study

d. Oral cholecystography

36. Investigation for assessing proper functioning of biliary system: (MCI March 2007)

- a. USG
- b. CT scan
- c. HIDA scan
- d. All of the above

37. Investigation of choice for acute cholecystitis:

- a. Plain Radiography
- b. USG
- c. CT scan
- d. Barium studies

GALLSTONES COMPLICATIONS AND TREATMENT

38. Not a complication of gallstones: (JIPMER 2010)

- a. Mucocele
- b. Diverticulosis
- c. Acute cholangitis
- d. Empyema of the gallbladder

39. True about Gallstone disease: (PGI SS Dec 2009)

- a. Acute cholecystitis presents with GB perforation
- b. Acute cholecystitis presents with mucosal ulceration of GB
- c. 80% cases of cholelithiasis are symptomatic
- d. Mucocele of GB contains infected bile

40. Gallstones may be complicated by which of the following?

- a. Pancreatitis
- b. Choledocholithiasis
- c. Acute cholecystitis
- d. Carcinoma stomach
- e. Carcinoma pancreas

41. Ursodeoxycholic acid is a: (PGI June 95)

- a. Urinary stone dissolving drug
- b. Thrombolytic drug
- c. Gallstone dissolving drug
- d. Antifibrinolytic

42. In which condition, medical treatment of Gallstone is indicated? (AIIMS Nov 96, All India 98)

- a. Stone is <15 mm size
- b. Radio opaque stone
- c. Calcium bilirubinate stone
- d. Non functioning gallbladder

43. Which one of the following statements is incorrect regarding gallbladder stones?

- a. Pigment stones are due to increased excretion of conjugated bilirubin
- b. Are considered a risk factor for the development of gallbladder carcinoma
- c. 10% gallstones are radio-opaque
- d. A mucocele of the gallbladder is caused by a stone impacted in Hartmann's pouch

44. Gallstones: (Orissa 98)

- a. Are about twice as common in men as in women
- b. There is an increased incidence of stones in diabetics
- c. About 80–90% of gallstones are radio-opaque
- d. Are usually more than 50 mm in diameter

45. Regarding stones in gallbladder the following are true except: (Kerala 2000)

- a. Mixed stones are common in the west
- b. In Saint's triad diverticulosis of colon and hiatus hernia coexist
- c. Is a risk factor in the development of GB carcinoma
- d. 90% of GB stones are radioopaque
- e. A mucocele of GB is caused by a stone impacted in the Hartmann's pouch

46. About gallstone, false is: (DPG 2006)
- Intervention should be done if gallstones are present in the bile duct irrespective of the duct diameter
 - Operation should be done in most cases
 - Can be caused due to parasitic infestation
 - Can lead to cholecystitis
47. All of the following are associated with the gallstones except: (MCI March 2005)
- Acute pancreatitis
 - Acute cholecystitis
 - Acute appendicitis
 - Acute cholangitis
48. Which of the following is a contraindication for medical management of gallstones? (Karnataka 2012)
- Radio-opaque stones
 - Radioluscent stones
 - Normal functioning gallbladder
 - Small stones

GALLSTONE ILEUS

49. In Gallstone ileus, obstruction is seen at: (Recent Question 2014) (AIIMS GIS Dec 2009)
- Jejunum
 - Proximal ileum
 - Distal ileum
 - Colon
50. All are true about Gallstone ileus except: (AIIMS GIS 2003)
- May be diagnosed with abdominal X-ray
 - Most common fistula is to duodenum
 - Tumbling obstruction
 - Cholecystectomy should be done in same episode
51. False about Gallstone ileus: (AIIMS GIS May 2008)
- 90% patients give history of biliary disease
 - Causes 1% of all SBO; around 25% cases in >70 years
 - Tumbling obstruction
 - Fistula is mostly formed between duodenum and gallbladder
52. Most common site of fistula in Gallstone ileus is between: (AIIMS GIS Dec 2006)
- GB and duodenum
 - GB and transverse colon
 - GB and stomach
 - GB and ileum
53. Rigler's triad consists of: (PGI May 2011, Nov 2009)
- Intestinal obstruction
 - Gas in bile duct
 - Cholangitis
 - Ectopic gallstone
54. Most common site of Gallstone impaction is: (All India 97)
- Duodenojejunal junction
 - Proximal to ileocaecal junction
 - Distal to ileocaecal junction
 - Colon
55. The most common site of intestinal obstruction in gallstone ileus is: (AIIMS May 2005, All India 2004)
- Duodenum
 - Jejunum
 - Ileum
 - Sigmoid colon
56. The treatment of Gallstone ileus is: (PGI June 99, UPSC 2008)
- Cholecystectomy alone
 - Removal of obstruction
 - Cholecystectomy, closure of fistula and removal of stone by enterotomy
 - Cholecystectomy with closure of fistula

MUCOCELE

57. The treatment of choice for a mucocele of gallbladder is: (AIIMS June 2004)
- Aspiration of mucous
 - Cholecystectomy
 - Cholecystostomy
 - Antibiotics and observation

58. Which of the following is false about mucocele of gall bladder? (Recent Question 2015)
- Complication of gall stones
 - Treatment is early cholecystectomy
 - Obstruction at neck of gall bladder
 - Gall bladder is never palpable

CHOLECYSTITIS AND CHOLECYSTECTOMY

59. Indications of prophylactic cholecystectomy are all except:
- Diabetes
 - Hemoglobinopathy
 - Gallstone size >3 cm
 - Porcelain GB (ILBS 2012)
60. Which of the following is not an indication for cholecystectomy? (ILBS 2011)
- GB polyp with stone
 - Asymptomatic polyp >1 cm
 - Multiple GB polyps
 - Symptomatic GB polyps
61. Not an indication for cholecystectomy for asymptomatic gallstones: (AIIMS GIS May 2011)
- Diabetes
 - Sickle cell anemia
 - Porcelain GB
 - In high prevalence area of CA GB
62. The indications of cholecystectomy are:
- Strawberry gallbladder (PGI Dec 2007, Dec 2006)
 - Mucocele of the gallbladder
 - Gall bladder polyp
 - Asymptomatic Gallstone disease
 - Symptomatic cholelithiasis
63. The technique of laparoscopic cholecystectomy was first described by: (AIIMS May 2011)
- Erich Muhe
 - Phillip Moure
 - Kurt Semm
 - Eddie Reddick
64. All are indications for cholecystectomy except: (JIPMER GIS 2011)
- Emphysematous cholecystitis
 - Biliary dyskinesia
 - Perforation of gallbladder
 - Adenomyomatosis
65. Prophylactic cholecystectomy is done in: (AIIMS GIS 2003)
- Calcified GB
 - Diabetes
 - Asymptomatic gallstones
 - Family history of gallstones
66. After surgery, there was 50 ml bile output from abdominal drain on 1st post-operative day. Management is: (JIPMER GIS 2011)
- Intrabiliary stent
 - Immediate exploration
 - T-tube drainage
 - Observation
67. Indication of cholecystectomy for gallstones disease is/are:
- Asymptomatic gallstones with DM (PGI Nov 2011)
 - Porcelain gallbladder
 - Asymptomatic with history of single attack of acute pancreatitis
 - Asymptomatic Gallstone disease
 - Symptomatic cholecystitis
68. Which of the following is the absolute contraindication for laparoscopic cholecystectomy?
- Clotting factor deficiency (NEET 2013, MHSSMCET 2005)
 - Perforation peritonitis
 - Empyema of the gallbladder
 - Adhesions

69. Contraindications of laparoscopic cholecystectomy is:

- Coagulopathy (Recent Question 2015)(DNB 2011)
- Obstructive pulmonary disease
- End stage liver disease
- All of the above

70. Which of the following is not an indication for cholecystectomy? (AIIMS May 2005)

- 70-years old male with symptomatic gallstones
- 20-years old male with sickle cell anemia and symptomatic gallstones
- 65-years old female with a large gallbladder polyp
- 55-years old with an asymptomatic gallstone

71. A 45-years old female presents with symptoms of acute cholecystitis. On USG there is a solitary gallstone of size 1.5 cm. Symptoms are controlled with medical management. Which of the following is the next most appropriate step in the management of this patient? (All India 2008)

- Regular follow up
- IV Antibiotics
- Laparoscopic cholecystectomy immediately
- Open cholecystectomy immediately

72. Antegrade cholecystectomy: (PGI Dec 2000)

- Starts from fundus
- Starts from cystic duct identification
- Starts from hilar dissection
- Considered unsafe

73. A 69-years old male patient having coronary artery disease was found to have gallbladder stones while undergoing a routine ultrasound of the abdomen. There was no history of biliary colic or jaundice at any time. What is the best treatment advice for such a patient for his gallbladder stones? (AIIMS Nov 2003, All India 2003)

- Open cholecystectomy
- Laparoscopic cholecystectomy
- No surgery for gallbladder stones
- ERCP and removal of gallbladder stones

74. The treatment of choice for silent gallbladder stones is:

- Observation (All India 97)
- Chenodeoxycholic acid
- Cholecystectomy
- Lithotripsy

75. Features of healthy gallbladder on laparotomy are:

- Typical "sea-green" colored (PGI Dec 2000)
- Wall is thin and elastic
- Cannot be emptied
- Not easily visible

76. Contraindication for laparoscopic cholecystectomy is all except: (Kerala 95)

- Shrunken liver
- Previous laparotomy
- Emphysema
- Obese individual

77. Most common malignancy after cholecystectomy is of:

- Colon
- Stomach
- Pancreas
- Ileum (PGI SS Dec 2005)

78. Laparoscopic cholecystectomy is largely preferred for all of the following reasons to conventional laparotomy except:

- Decrease pain (SGPGI 2004)
- Decreased incidence of bile duct injuries
- Smaller scar
- Decreased stay in hospital

79. A 50-years old with history of jaundice in the past has presented with right upper quadrant abdominal pain.

Examination and investigations reveal chronic calculous cholecystitis. The liver functions tests are within normal limits and on ultrasound examination, the common bile duct is not dilated. Which of the following will be the procedure of choice in her? (J and K 2005)

- Laparoscopic cholecystectomy
- Open choledocholithotomy with CBD exploration
- ERCP + choledocholithotomy followed by laparoscopic cholecystectomy
- Laparoscopic cholecystectomy followed by ERCP + choledocholithotomy

80. A 88-year male patient presented with end stage renal disease with coronary artery block and metastasis in the lungs. Now presents with acute cholecystitis, patient's relatives need treatment to do something: (UPPG 2008)

- Open cholecystectomy
- Tube cholecystostomy
- Laparoscopic cholecystectomy
- Antibiotics then elective cholecystectomy

81. An otherwise normal female presents with symptoms of flatulent dyspepsia. She was started on proton pump inhibitors, which controlled her symptoms. The next step in management of this condition should be: (All India 2008)

- Immediate laparoscopic cholecystectomy
- Laparotomy after 1 or 2 months
- Wait and watch
- ERCP

82. In cholecystectomy, fresh plasma should be given:

- Just before operation (UPPG 2008)
- At the time of operation
- 6 hours before operation
- 12 hours after operation

ACALCULOUS CHOLECYSTITIS**83. All are true about acute acalculous cholecystitis except:**

- Distended GB is seen in scintigraphy
- Vascular cause (AIIMS GIS May 2011)
- Seen in bed ridden patients
- Rapid course

84. Acalculous cholecystitis can be seen in all except:

- Dengue hemorrhagic fever (Punjab 2008, AIIMS Nov 2005)
- Malaria
- Leptospirosis
- Enteric fever

85. Acalculous cholecystitis are caused by:

- DM (PGI Dec 2006, Dec 2001)
- TPN
- Leptospirosis
- Estrogen therapy

86. Acalculous cholecystitis is caused by: (PGI Dec 2001)

- Diabetes mellitus
- Total parenteral nutrition
- Tuberculosis
- Anemia
- Malignancy

87. Which of the following statements about acalculous cholecystitis is incorrect? (DPG 2009 March)

- Manifestation of disturbed microcirculation in critically ill patient
- Prolonged parenteral nutrition can be causative
- It is life threatening condition
- Cholecystectomy is not indicated

88. All of the following are cause of acalculous cholecystitis except: (Recent Questions 2013)

- a. Bile duct stricture
- b. Schistostoma
- c. Prolonged TPN
- d. Major operations

XANTHOGRANULOMATOUS CHOLECYSTITIS

89. All of the following statements about Xanthogranulomatous inflammation are true except: (NEET Pattern)

- a. Foam cells are seen
- b. Yellow nodules are seen
- c. Multinucleated giant cells are seen
- d. Associated with tuberculosis

EMPHYSEMATOUS CHOLECYSTITIS

90. Acute emphysematous cholecystitis is caused by:

- a. *Pseudomonas aeruginosa* (JIPMER 2012, 2010)
- b. *Staphylococcus*
- c. *Clostridium perfringens*
- d. *Streptococcus pyogenes*

91. All of the following are correct regarding emphysematous cholecystitis except: (NEET Pattern, DNB 2010)

- a. More common in males
- b. More common in diabetics
- c. In many cases the gallbladder does not contain stone
- d. It is caused most commonly by *Pseudomonas*

MIRIZZI'S SYNDROME

92. Type II Mirizzi's syndrome:

- a. Obstruction of common duct by external compression only (no erosion)
- b. Erosion of one-third circumference of common duct
- c. Erosion of up to two-third circumference of common duct
- d. Total/near total circumferential destruction of common duct

93. Mirizzi syndrome is: (Recent Question 2015, 2014, DNB 2011)

- a. GB stone compressing common hepatic duct
- b. GB carcinoma invading IVC
- c. GB stone causing cholecystitis
- d. Pancreatic carcinoma

STRAWBERRY GALLBLADDER

94. Cholesterosis is: (Karnataka 94)

- a. Disease of defective metabolism of choline
- b. Concerned with epithelial tumors of brain
- c. Diffuse deposition of cholesterol in mucosa of gallbladder
- d. Disease concerned with obstructive jaundice

GALLBLADDER POLYP AND ADENOMYOMATOSIS

95. Indications of cholecystectomy in GB polyp removal are all except: (ILBS 2012)

- a. Size >1 cm
- b. With stone
- c. >3 in number
- d. Locally invasive

96. Risk factors associated with malignancy in GB polyp are all except: (JIPMER GIS 2011)

- a. Age > 60 years
- b. Co-existence of gallstones
- c. Size > 5 mm
- d. Documented increase in size

97. Risk factors for malignant change in an asymptomatic patient with a gallbladder polyp on ultrasound include all of the following, except: (AIIMS May 2011, All India 2009)

- a. Age > 60 years
- b. Rapid increase in size of polyp
- c. Size of polyp > 5 mm
- d. Associated gallstones

98. False about GB polyps: (AIIMS GIS May 2008)

- a. Adenomyomatosis < 1 cm, pedunculated
- b. Cholesterol polyps are most common
- c. Symptomatic polyps are indication for cholecystectomy
- d. Polyp with stone is an increased risk of malignancy

99. On abdominal ultrasound gallbladder shows diffuse wall thickening with hyperechoic nodules at neck and comet tail artifacts. The most likely diagnosis will be: (AIIMS May 2011)

- a. Adenomyomatosis
- b. Adenocarcinoma of gallbladder
- c. Xanthogranulomatous cholecystitis
- d. Cholesterol crystals

100. All of the following are risk factors for CA GB except:

- a. Gallstones (JIPMER GIS 2011)
- b. Adenomyomatosis
- c. Porcelain gallbladder
- d. Choledochal cyst

CARCINOMA GALLBLADDER PREDISPOSING FACTORS

101. True about CA GB and gallstones: (GB Pant 2011)

- a. 3% association
- b. 30% association
- c. 50% association
- d. 90% association

102. Precancerous lesions of GB are all except:

- a. Porcelain GB
- b. Typhoid carrier
- c. ABPDJ
- d. Biliary ascariasis (AIIMS GIS Dec 2010)

103. Organism associated with fish consumption and also causes carcinoma gallbladder: (AIIMS Nov 2012, AIIMS Nov 2010)

- a. *Gnathostoma*
- b. *Anglostrongyloidosis cantonensis*
- c. *Clonorchis sinensis*
- d. *H. diminuta*

104. Risk factor for carcinoma gallbladder: (PGI Nov 2011)

- a. Female sex
- b. Choledochal cysts
- c. Xanthogranulomatous cholecystitis
- d. Calcification of gallbladder
- e. Gallstone

105. All are risk factors for CA GB except: (GB Pant 2011)

- a. Adenomyosis
- b. ABPDJ
- c. Gallstones
- d. Adenomatous polyps

106. All of the following are risk factors for carcinoma gallbladder, except: (AIIMS June 2004)

- a. Typhoid carriers
- b. Adenomatous gallbladder polyps
- c. Choledochal cyst
- d. Oral contraceptives

107. **Precancerous lesion of gallbladder is:** (AIIMS June 98)
- Porcelain gallbladder
 - Mirizzi's syndrome
 - Cholesterosis
 - Acalculous Cholecystitis

108. **All of the following are true about porcelain gallbladder except:** (Kerala PG 2015)
- May be seen on plain X-ray
 - More commonly diagnosed on CT
 - It is an indication for cholecystectomy
 - Always denotes benign etiology

CARCINOMA GALLBLADDER

109. **In a male after laparoscopic cholecystectomy, specimen is sent for histopathology which shows carcinoma gallbladder stage T1a. Appropriate management is:** (AIIMS May 2011)
- Conservative and follow up
 - Extended cholecystectomy
 - Excision of all port sites
 - Radiotherapy
110. **After laparoscopic cholecystectomy, if biopsy reveals in-situ cancer of gallbladder (Stage-I), then the appropriate management is:** (Orissa 2011)
- Follow-up
 - Extended cholecystectomy
 - Excision of all port sites
 - Radiotherapy
111. **Survival in unresectable GB carcinoma is?** (AIIMS May 2011)
- 4–6 months
 - 8–10 months
 - 1 year
 - 12–24 months
112. **T2N1 of CA GB represents which stage?** (KGMC 2011)
- IA
 - IB
 - II
 - III
113. **True about CA GB:** (ILBS 2012)
- T1a can be treated and cured by laparoscopic cholecystectomy
 - T1b needs radical operation in all cases
 - Port site metastasis is localized disease
 - Pre-operative diagnosis of CA GB has different survival according to stage
114. **Most common gallbladder malignancy?** (MHSSMCET 2008)
- Adenocarcinoma
 - Squamous cell carcinoma
 - Mucinous cystadenocarcinoma
 - Serous cystadenocarcinoma
115. **All are true about CA GB except:** (GB Pant 2011)
- Redo surgery is radical or extended cholecystectomy increases significant survival advantage
 - Inter-aortocaval node involvement potentially rule out cure
 - <25% 5-years survival for all stages
 - Pancreaticoduodenectomy has 5 year survival of 25%
116. **True about CA GB:** (PGI SS Dec 2009)
- Most commonly presents with obstructive jaundice
 - 90% are associated with gallstones
 - 5-years survival is 35%
 - 30% are squamous cell carcinoma
117. **Best prognosis in CA GB is seen in:** (PGI SS Dec 2009)
- Papillary
 - Adenocarcinoma
 - Squamous
 - Melanoma
118. **False regarding CA GB:** (PGI SS Dec 2010)
- T1a: simple cholecystectomy
 - T1b: extended cholecystectomy
 - T1a: extended cholecystectomy if carcinoma in neck of gallbladder
 - Excision of port sites improves survival
119. **Laparoscopic cholecystectomy was done, on histopathology, stage was T2. Next line of treatment:** (AIIMS GIS 2003)
- Observation
 - Extended cholecystectomy
 - Port site excision
 - Chemotherapy
120. **Commonest type of carcinoma gallbladder with gallstones is:** (AIIMS Nov 95)
- Adenocarcinoma
 - Anaplastic carcinoma
 - Squamous cell carcinoma
 - Transitional cell carcinoma
121. **Factors associated with gallbladder carcinoma:** (PGI June 2005)
- Chronic cholesterol stone
 - Hyperlipidemia
 - Chronic gallbladder disease
 - Hepatitis
 - Porcelain gallbladder
122. **A 40-years old woman has undergone a cholecystectomy. The histopathology reveals that she has a 3 cm adenocarcinoma in the body of the gallbladder infiltrating up to the serosa. Which of the following further management would you advise her?** (AIIMS Nov 2004)
- Chemotherapy
 - Radiotherapy
 - Radical cholecystectomy
 - Follow up with regular ultrasound examinations
123. **Regarding carcinoma gallbladder:** (PGI June 2002)
- Squamous cell carcinoma is the most common
 - Present with jaundice
 - Good prognosis
 - Gallstones predispose
 - 65% survival after surgery
124. **Commonest association seen in carcinoma gallbladder:** (AIIMS 91)
- Peritoneal deposits
 - Duodenal infiltration
 - Secondaries to liver
 - Cystic node involvement
125. **Most common type of cancer gallbladder in a patient with gallstone:** (APPG 2005)
- Adenocarcinoma
 - Squamous carcinoma
 - Sarcoma
 - None
126. **In a male after laparoscopic cholecystectomy, specimen is sent for histopathology which shows carcinoma gallbladder stage IB. Appropriate management is:** (AIIMS Nov 2008)
- Conservative and follow up
 - Extended cholecystectomy
 - Excision of all port sites
 - Radiotherapy
127. **All of the following are false for carcinoma gallbladder except:** (MCI March 2010)
- Carries a good prognosis
 - Gallstones may be a predisposing factor
 - Commonly squamous cell carcinoma
 - Jaundice is rare

GALLBLADDER ANATOMY AND PHYSIOLOGY

128. **Bile is concentrated in the gallbladder to times:** (PGI Dec 2006, Dec 2001)
- 5
 - 10
 - 20
 - 50

EXPLANATIONS

GALLSTONES PATHOGENESIS

1. Ans. b. BMI >30 kg/m² with family history of gallstone (Ref: Sabiston 19/e p1485-1486)

- Only first-degree relatives^Q of patients with gallstones and obesity^Q (defined as body mass index >30 Kg/m²) have been identified as strong risk factors for development of symptomatic gallstone disease.

2. Ans. c. Crystallization (Ref: Sabiston 19/e p1485-1486; Schwartz 9/e p1144-1145, 10/e p1318-1319; Bailey 26/e p1106-1107, 25/e p1119-1120; Blumgart 5/e p483-487; Shackelford 7/e p1298-1299; Harrison 18/e p2617)

PATHOGENESIS OF CHOLESTEROL GALLSTONES

- Cholesterol is insoluble in water (water is major constituent of bile, 85-95%)^Q.
- Bile acid and phospholipids in bile keep cholesterol in solution by the formation of micelles^Q.
- An excess of cholesterol relative to bile acids and phospholipids allows cholesterol to form crystals and such bile is called lithogenic or supersaturated bile^Q.

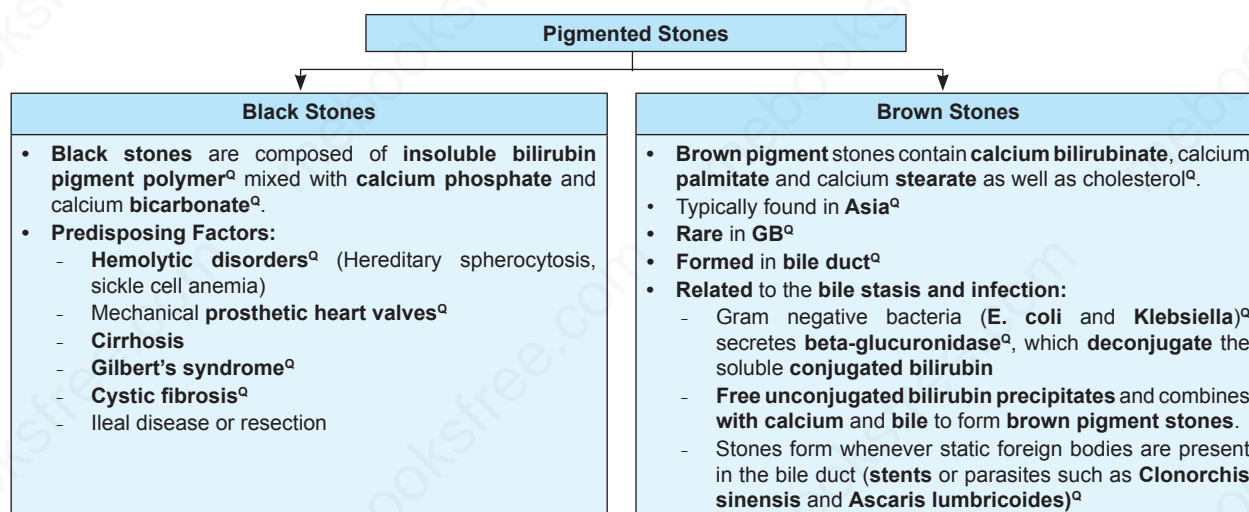
Factors Responsible for Formation of Gallstones		
Lithogenic bile	Nucleation	Stasis or GB hypomotility
<ul style="list-style-type: none"> Increased Biliary Cholesterol: <ul style="list-style-type: none"> Obesity^Q Cholesterol rich diet^Q Clofibrate therapy^Q Decreased Bile Acids: <ul style="list-style-type: none"> Primary biliary cirrhosis OCPs^Q Mutation of CYP7A1 gene^Q Impaired enterohepatic circulation of bile acids: Ileal disease or resection, cholestyramine or colestipol (bile acid sequestrants)^Q Decreased Biliary Lecithin: <ul style="list-style-type: none"> MDR-3 gene mutation^Q leads to defective lecithin secretion in bile 	<ul style="list-style-type: none"> Cholesterol monohydrate crystal agglomerate to become macroscopic crystal by nucleation Pro-nucleating Factors: <ul style="list-style-type: none"> Mucin^Q Non-mucin glycoprotein^Q Infection^Q Anti-nucleating Factors: <ul style="list-style-type: none"> Apolipoprotein A-I and A-II^Q Excess of pro-nucleating factors or deficiency of anti-nucleating factors results in formation of gallstones 	<ul style="list-style-type: none"> Prolonged TPN^Q Prolonged fasting^Q Pregnancy^Q Octreotide^Q OCPs^Q Massive burns^Q

- Mutation of CYP7A1 resulting in deficiency of cholesterol 7-alpha hydroxylase, results in impaired hepatic conversion of cholesterol to bile acids^Q.

3. Ans. b. Diabetes mellitus (Ref: Sabiston 19/e p1485-1486; Maingot 11/e p848)

Risk Factors for Gallstones	
<ul style="list-style-type: none"> Obesity^Q Rapid weight loss^Q Childbearing Multiparity Female sex^Q 	<ul style="list-style-type: none"> First-degree relatives^Q Drugs: Ceftriaxone^Q, postmenopausal estrogens^Q, TPN^Q Ethnicity: Native American (Pima Indian^Q), Scandinavian Ileal disease, resection or bypass^Q Increasing age
<ul style="list-style-type: none"> Patients with diabetes have increased risk of developing gallstones due to: <ul style="list-style-type: none"> Increased cholesterol level in bile Reduced bile acid pool Decreased GB motility 	

4. Ans. b. Secondary CBD stones (Ref: Sabiston 19/e p1485-1486; Schwartz 9/e p1145, 10/e p1318-1319; Bailey 26/e p1106-1107, 25/e p1120; Blumgart 5/e p483-487; Harrison 18/e p2618)



5. Ans. b. More common in Caucasians

Brown pigment stones are common in Asians^a, not the caucasians.

6. Ans. b. (↓Bile and cholesterol ratio)

7. Ans. d. Vagal stimulation (Ref: Sabiston 19/e p1485-1486; Bailey 26/e p1107, 25/e p1120; Harrison 18/e p2617)

- Vagal stimulation increases GB motility and prevents Gallstone formation^a.

8. Ans. d. Hypercholesterolemia

- Hyperalimentation decreases GB motility promotes stasis and Gallstone formation.
- Primary biliary cirrhosis decreases bile salt secretion in bile.
- Clofibrate therapy increases biliary cholesterol.

9. Ans. b. Ileal resection

10. Ans. d. More common in males between 30–40 years of age

11. Ans. a. TPN

12. Ans. a. More common in females

13. Ans. a. Renal stones

Important Triads		
Triad	Seen in	Components
Virchow's Triad ^a	Thrombosis	Hypercoagulability + Stasis + Endothelial injury ^a
Galezia's Triad ^a		Dupuytren's contracture + Retroperitoneal fibrosis + Peyronie's disease of penis ^a
Cushing's Triad ^a	Intracranial hypertension	↑BP + Bradycardia + ↓respiratory rate
Hutchison's Triad ^a	Congenital syphilis	Hutchison's teeth (notched upper incisors) + Interstitial keratitis + Nerve deafness ^a
Trotter's Triad ^a	Nasopharyngeal Carcinoma	Conductive hearing loss + Immobility of homolateral soft palate + Trigeminal neuralgia ^a
Saints Triad		Hiatus hernia + Gallstones+ Colonic diverticulosis ^a
Dieulafoy's Triad ^a	Acute appendicitis	Hypersensitiveness of skin + Reflex muscular contraction + tenderness at Mac Burney's point ^a
Quinck's Triad ^a	Hemobilia	GI hemorrhage + biliary colic + jaundice ^a
Borchardt's Triad ^a	Gastric Volvulus	Epigastric pain + Inability to vomit + Inability to pass a NG tube ^a
Tillaux's Triad ^a	Mesenteric cyst	Soft fluctuant swelling in umbilical region + Freely mobile perpendicular to mesentery + Zone of resonance all around ^a
Mackler's Triad ^a	Boerhaave's syndrome	Thoracic pain + vomiting + cervical subcutaneous emphysema ^a
Rigler's Triad ^a	Gallstone ileus	Small bowel obstruction + Pneumobilia + Ectopic gallstone ^a
Whipple's Triad ^a	Insulinoma	Symptoms of hypoglycemia + S. glucose <45 mg/dl + Symptomatic relief on glucose ingestion ^a

14. Ans. c. Mixed (Ref: Bailey 25/e p1120)

MIXED GALLSTONES

- Most common gallstones, account for 90% calculi^a

15. Ans. a. 10%

- Most (90%) gallstones are radioluscent^Q.
- Most (90%) kidney stones are radiopaque^Q.

16. Ans. c. Ampulla of vater (Ref: [digestive.niddk.nih.gov](#))

- Most gallstones pass out of the body unnoticed, but some become lodged in the common bile duct, causing jaundice^Q.
- A frequent site of gallstone impaction is the ampulla of Vater^Q, where the common channel meets the small intestine.
- Blockage of the common channel by a gallstone can induce acute pancreatitis^Q.

17. Ans. c. > a. Ileal resection > Truncal vagotomy

18. Ans. a. Oxalate

19. Ans. d. All of the above

20. Ans. d. Pale yellow

21. Ans. c. Cholesterol

- Cholesterol stones contain almost entirely cholesterol and are often solitary, pale yellow in color^Q.

22. Ans. b. Pigment (Ref: [Bailey 26/e p1106, 25/e p1120](#))

- In the USA and Europe, 80% are cholesterol or mixed stones, whereas in Asia, 80% are pigment stones^Q.

- MC gallstone: Mixed (90%)^Q
- MC gallstones in USA and Europe: Cholesterol stones^Q (Mixed, if given in the option)
- MC gallstones in India (Asia): Pigment stones (80%)^Q

GALLSTONES

- In the USA and Europe, 80% are cholesterol or mixed stones, whereas in Asia, 80% are pigment stones^Q.
- Cholesterol or mixed stones contain 51–99% pure cholesterol plus an admixture of calcium salts, bile acids, bile pigments and phospholipids^Q.
- Pigment stone is the name used for stones containing <30% cholesterol^Q.
- Black stones are largely composed of an insoluble bilirubin pigment polymer mixed with calcium phosphate and calcium bicarbonate^Q.
- Brown pigment stones contain calcium bilirubinate, calcium palmitate and calcium stearate, as well as cholesterol^Q.
- Brown stones are rare in the gallbladder. They form in the bile duct and are related to bile stasis and infected bile^Q.

23. Ans. d. Diabetes

24. Ans. b. Bacterial nidus of infection may be seen (Ref: [www.ncbi.nlm.nih.gov/pubmed/2213913](#))

- Recently, bacterial infection has been shown to play the role in pathogenesis of gallstone, this adds to the growing pool of studies finding an infectious nidus in these gallstones^Q.

25. Ans. c. <30 (Ref: [Bailey 26/e p1106, 25/e p1120](#))

- Pigment stone is the name used for stones containing <30% cholesterol^Q.

Classification of Gallstones			
	Cholesterol	Black pigment	Brown pigment
Location	Gallbladder and bile duct	Gallbladder and bile duct	Bile ducts ^Q
Major constituent	Cholesterol	Bilirubin pigment polymer ^Q	Calcium bilirubinate ^Q
Consistency	Crystalline with nucleus	Hard ^Q	Soft, friable ^Q
% Radio-opaque	15%	60% ^Q	0% ^Q

26. Ans. b. Cholesterol

GALLSTONES: INVESTIGATIONS

27. Ans. c. USG (Ref: [Sabiston 19/e p1487](#); [Schwartz 9/e p1146](#); [Bailey 26/e p1100-1101, 25/e p1113-1114](#); [Shackelford 7/e p1303, 1306](#))

- IOC for acute cholecystitis: USG^Q
- Gold standard for diagnosis of acute cholecystitis: HIDA scan^Q
 - USG is IOC for acute calculous cholecystitis, chronic cholecystitis and cholelithiasis^Q.

28. Ans. a. Gallstones (Ref: Bailey 26/e p1099, 25/e p1112)

MERCEDES BENZ SIGN OR SEAGULL SIGN

- The centre of Gallstone may contain radiolucent gas in a **triradiate** or **biradiate** fissure, this gives rise to characteristic dark shapes on radiograph, the Mercedes Benz sign or Seagull sign^Q.

29. Ans. b. Motor mechanisms of gallbladder (Ref: Schwartz 9/e p1141; Bailey 26/e p1100, 25/e p1113)

- Motor mechanism of GB is a requirement for medical treatment of gallstones, not for oral cholecystography.

ORAL CHOLECYSTOGRAPHY (GRAHAM COLE TEST)

- Once considered the diagnostic test of choice for gallstones, oral cholecystography has been replaced by **ultrasonography**.
- It involves **oral administration** of a **radiopaque compound** that is **absorbed**, **excreted** by the **liver**, and **passed** into the **gallbladder**^Q.

Successful Visualization of GB in Oral Cholecystography depends on

- | | |
|---|--|
| <ul style="list-style-type: none"> Blood flow to the liver^Q Ability of the liver cells to excrete dye into the bile (functioning liver)^Q | <ul style="list-style-type: none"> Patency^Q of hepatic and cystic duct system Ability of GB to concentrate the excreted dye^Q (by absorbing water) |
|---|--|

- Stones are noted on a film as **filling defects** in a visualized, **opacified** gallbladder.

Oral cholecystography is of no value in patients with

- | | |
|--|---|
| <ul style="list-style-type: none"> Intestinal malabsorption^Q Vomiting^Q | <ul style="list-style-type: none"> Obstructive jaundice^Q Hepatic failure^Q |
|--|---|

30. Ans. c. Ultrasound (Ref: Sabiston 19/e p1481; Schwartz 9/e p1140, 10/e p1314, 1319-1320; Bailey 26/e p1100, 25/e p1113-1114; Blumgart 5/e p223; Shackelford 7/e p1303)

- USG is IOC for acute calculous cholecystitis, chronic cholecystitis and cholelithiasis.

ULTRASONOGRAPHY

- Initial imaging modality of choice** in obstructive jaundice^Q
- It is **operator dependent** and may be **suboptimal** due to **excessive body fat** and **intraluminal bowel gas**^Q.

USG can demonstrate

- | | |
|--|---|
| <ul style="list-style-type: none"> Biliary calculi^Q Size of GB and CBD^Q Thickness of GB wall^Q | <ul style="list-style-type: none"> Presence of inflammation^Q around GB Occasionally, presence of stones within the biliary tree^Q. |
|--|---|

- It may even show a **carcinoma** of the **pancreas occluding** the **CBD**^Q.

USG in obstructive jaundice

- | |
|---|
| <ul style="list-style-type: none"> Initial imaging modality of choice in obstructive jaundice^Q It can identify intra- and extrahepatic biliary dilatation^Q Identify the level of obstruction^Q Cause of the obstruction^Q may also be identified (gallstones in the gallbladder, common hepatic or CBD stones or lesions in the wall of the duct suggestive of a cholangiocarcinoma or enlargement of the pancreatic head indicative of a pancreatic carcinoma)^Q |
|---|

31. Ans. a. Oral cholecystography

32. Ans. d. USG

33. Ans. a. Iopanoic acid

- Iopanoic acid is used in oral cholecystography^Q.
- Biligriffin is used in IV cholangiography^Q.

34. Ans. c. Biligriffin

35. Ans. a. Ultrasound

36. Ans. c. HIDA scan (Ref: Sabiston 19/e p1482; Schwartz 9/e p1141; Bailey 26/e p1101, 25/e p1114; Blumgart 5/e p254-270; Shackelford 7/e p1306)

RADIOISOTOPE SCANNING

- Technetium-99m** labelled derivatives of **iminodiacetic acid** (**HIDA**, **IODIDA**) are, when injected intravenously, **selectively taken up** by the **reticuloendothelial cells** of the **liver** and **excreted** into **bile**^Q.

HIDA Scan

- Allows **visualization** of the **biliary tree** and **gallbladder**^Q
 - Presence of **inflammation**^Q around GB
 - Occasionally, **presence of stones within the biliary tree**^Q.
 - **GB is visualized within 30 min of isotope injection** in **90%** of normal individuals and within 1 hour in the remainder.
 - The **bowel** is usually **seen within 1 hour** in the majority of patients.
 - **Non-visualization** of the **GB** is suggestive of **acute cholecystitis**^Q.
 - If the patient has **contracted gallbladder**, as often occurs in **chronic cholecystitis**, **GB visualization** may be **reduced or delayed**^Q.
- **Biliary scintigraphy** may also be **helpful in diagnosing bile leaks** and **iatrogenic biliary obstruction**^Q.
 - **Scintigraphy** can **confirm the presence** and **quantify the leak**^Q.

37. Ans. b. USG

GALLSTONES COMPLICATIONS AND TREATMENT

38. Ans. b. Diverticulosis (Ref: Sabiston 19/1486-1489; Bailey 26/1107, 25/1120; Blumgart 5/483-487)

Effects and Complications of Gallstones		
In gallbladder	In Bile duct	In Intestine
<ul style="list-style-type: none"> • Silent stones • Acute cholecystitis • Chronic cholecystitis • Mucocele • Empyema • Perforation • Gangrene • Carcinoma 	<ul style="list-style-type: none"> • Obstructive jaundice • Cholangitis • Acute pancreatitis 	<ul style="list-style-type: none"> • Gallstone ileus

39. Ans. b. Acute cholecystitis presents with mucosal ulceration of GB (Ref: Sabiston 19/e p1487-1488; Schwartz 9/e p1147, 10/e p1321; Bailey 26/e p1107, 25/e p1120; Blumgart 5/e p487-494; Shackelford 7/e p1315-1317)

ACUTE CHOLECYSTITIS

- Acute cholecystitis is **related to gallstones** in **90–95%** of cases.
- **Characteristic triad: RUQ pain + Fever + Leukocytosis**^Q

Etiopathogenesis

- **Obstruction** of the **cystic duct** leading to **biliary colic** is the initial event in acute cholecystitis.
- An inflammatory process with a thickened and **reddish wall** with **subserosal hemorrhage**^Q.
- **Mostly the gallstone dislodges**, and the inflammation will gradually resolve.
- In the **most severe cases**, this process can lead to **ischemia** and **necrosis** of the GB wall (**5–10%**).

Clinical Features

- **RUQ pain** of **much longer duration** than biliary colic, is the **MC symptom**^Q
- Other common symptoms: Fever, nausea, and vomiting.
- **Physical examination: RUQ tenderness** and **guarding** are usually present **inferior to the right costal margin**, distinguishing the episode from simple biliary colic.
- A **mass (gallbladder and adherent omentum)** is occasionally palpable^Q
- **Murphy's sign**^Q: **Inspiratory arrest** with **deep palpation** in the RUQ in acute cholecystitis (also known as **Naunyn's sign**)
- **Boa's sign**^Q: **Hyperesthesia below right scapula** in acute cholecystitis

- A **mild leukocytosis** is **usually present** (12,000–14,000 cells/mm³).
- Mild elevations in serum bilirubin (>4 mg/dL), ALP, transaminases, and amylase may be present.

Diagnosis

- **USG: IOC** for diagnosing **acute cholecystitis**^Q (sensitivity 85%, specificity 95%).
- **HIDA scan: Gold standard**^Q for diagnosing **acute cholecystitis**

- **USG findings:** Presence of **gallstones**, **thickening** of the GB wall (**>4 mm**), pericholecystic fluid, GB distention, impacted stone, and a **sonographic Murphy's sign**^Q (focal tenderness directly over the GB).

- **HIDA scan:** No filling of GB with the radiotracer (^{99m}Tc -HIDA) after 4 hours indicates an **obstructed cystic duct**^Q
- A normal HIDA scan excludes acute cholecystitis^Q.

Treatment

- IV fluids, antibiotics, and analgesia should be initiated^Q.
- Cholecystectomy is the **definitive treatment**^Q for patients with acute cholecystitis.

- Early cholecystectomy performed within 2 to 3 days (within 72 hours)^Q of presentation is preferred over interval or delayed cholecystectomy that is performed 6 to 10 weeks after initial medical therapy.
 - Laparoscopic cholecystectomy is the preferred approach to patients with acute cholecystitis^Q.
- The conversion rate to an open cholecystectomy is higher (4%–35%) in the setting of acute cholecystitis than with chronic cholecystitis.
- Morbidity rate, hospital stay, and time to return to work are lower in patients undergoing laparoscopic cholecystectomy than open cholecystectomy.

- Early laparoscopic cholecystectomy, due to a reduced length of hospital stay and readmissions, is a more cost-effective approach than open cholecystectomy for acute cholecystitis.

40. Ans. a. Pancreatitis, b. Choledocholithiasis, c. Acute cholecystitis

41. Ans. c. Gallstone dissolving drug (Ref: Sabiston 19/e p1486; Blumgart 5/e p512; Harrison 18/e p2621)

MEDICAL THERAPY FOR GALLSTONES

- Medical therapy for gallstones utilizes bile acids: **Chenodeoxycholic acid (CDCA)** and **Ursodeoxycholic acid (UDCA)**^Q

Mechanism of Action

- They inhibit HMG-CoA reductase^Q, the rate limiting enzyme for cholesterol synthesis, thus decreases cholesterol saturation of bile^Q
- They cause dispersion of the cholesterol from the stones by physico-chemical means^Q

Prerequisites for Medical Treatment	Drawbacks of Medical treatment
<ul style="list-style-type: none"> • Radiolucent (cholesterol) stones^Q • Stones <10 mm in diameter^Q • Functioning GB^Q • Non-acute symptoms^Q 	<ul style="list-style-type: none"> • Low rates of complete resolution^Q • High recurrence rate^Q • Not cost-effective (expensive drug has to be taken for up to 2 years)^Q • Need of maintenance therapy to prevent recurrence^Q

42. Ans. a. Stone is <15 mm size

43. Ans. a. Pigment stones are due to increased excretion of conjugated bilirubin

44. Ans. b. There is an increased incidence of stones in diabetics

45. Ans. d. 90% of GB stones are radiopaque

46. Ans. b. Operation should be done in most cases

- Operation is not done in most cases of gallstones, done in symptomatic cases.

47. Ans. c. Acute appendicitis

48. Ans. a. Radio-opaque stones

GALLSTONE ILEUS

49. Ans. c. Distal ileum (Ref: Sabiston 19/e p1500; Blumgart 5/e p649-655; Shackelford 7/e p865)

GALLSTONE ILEUS

- Passage of a stone through a spontaneous biliary-enteric fistula leading to a mechanical bowel obstruction^Q
- MC site of fistula: Between the gallbladder and duodenum^Q
- 2nd MC site: Between gallbladder and transverse colon^Q.

Clinical Features

- **Rigler's triad**^Q: The classic plain abdominal film triad of small bowel obstruction, pneumobilia, and ectopic gallstone is considered pathognomonic^Q.
- Most cholecystoduodenal fistula does not result in Gallstone ileus^Q. Rather, they are asymptomatic^Q or occur in associated with usual digestive complaints consistent with gastric or biliary tract disease.
- Occurs most commonly in the elderly (>70 years)^Q.

- Accounts for **1%** of all cases of **small bowel obstruction** and occur in fewer than 1% of patients with gallstones

Bouveret's Syndrome

- Duodenal obstruction** due to gallstones, usually in the **bulb** is known as **Bouveret's syndrome**^Q.
- It is treated by **duodenostomy** or **pyloroplasty**^Q.

- Nausea, vomiting, and abdominal pain**, signs and symptoms of intestinal obstruction,
- A history of **gallstone-related symptoms** may be present in only **50%** of patients.
- Pain** may be **episodic** and **recurrent** as the impacted stone temporarily obstructs the bowel lumen and then dislodges and moves distally, known as **tumbling obstruction**^Q.
- The **MC site of obstruction** is the **ileum**^Q (60%); followed by the **jejunum** (15%); **stomach** (15%); colon (5%, sigmoid colon); duodenum (5%).

Diagnosis

- Abdominal X-ray**: Evidence of an **intestinal obstruction** with **pneumobilia** or a **calcified stone**^Q distant from the gallbladder.
- MC site of obstruction** is the **terminal ileum**^Q because of its narrow lumen.

Treatment

- It is a **surgical emergency**^Q without a period of waiting in the hope that stone will pass
- In case of **obstruction in the ileum calculus** can be **manipulated proximally** to a **healthy jejunum**^Q where a **safe enterotomy** and stone removal may be executed.
- Stable patients**: **Takedown of the biliary-enteric fistula** and **cholecystectomy**^Q during the same procedure is warranted because recurrent cholecystitis and cholangitis are common.

- Unstable patients** or a **significant inflammation** in RUQ: **Unstable to withstand a prolonged operative procedure**, the fistula can be addressed at a second laparotomy^Q.

50. Ans. d. Cholecystectomy should be done in same episode

- Most patients in Gallstone ileus are **unstable to withstand a prolonged operative procedure**, so **cholecystectomy should not be done in same episode**.
- Fistula** can be addressed at a **second laparotomy**^Q

51. Ans. a. 90% patients give history of biliary disease

52. Ans. a. GB and duodenum

53. Ans. a. Intestinal obstruction, b. Gas in bile duct, d. Ectopic gallstone

54. Ans. b. Proximal to ileocecal junction

55. Ans. c. Ileum

56. Ans. b. Removal of obstruction

MUCOCELE

57. Ans. b. Cholecystectomy (Ref: Bailey 26/e p1107-1108, 25/e p1120, 1122; Harrison 18/e p2622)

MUCOCELE (HYDROPS)

- Hydrops** or **mucocele** result from **prolonged obstruction** of the **cystic duct**, usually by a **large solitary calculus**^Q.
- Obstructed GB lumen** is progressively **distended** by **mucus** (mucocele) or by a **clear transudate** (hydrops) produced by mucosal epithelial cells^Q.

Clinical Features

- A **visible, easily palpable, nontender gallbladder**^Q sometimes extending from the RUQ into the right iliac fossa may be found on physical examination.
- The patient with hydrops of the gallbladder **frequently remains asymptomatic**^Q, although chronic RUQ pain may also occur.

Treatment

- Early cholecystectomy**^Q, because empyema, perforation, or gangrene may complicate the condition.

GALLBLADDER EMPYEMA

- GB empyema results from **progression of acute cholecystitis** with **persistent cystic duct obstruction** to **superinfection**^Q of the stagnant bile with a pus-forming bacterial organism.

Clinical Features

- Clinical picture resembles that of **cholangitis** with **high fever**; **severe RUQ pain**; marked **leukocytosis**; and often, prostration^Q.
- Empyema carries a **high risk of gram-negative sepsis** and/or **perforation**^Q.

Treatment

- Emergency surgical intervention** with **antibiotic coverage** is required as soon as the diagnosis is suspected.

58. Ans. d. Gall bladder is never palpable

CHOLECYSTITIS AND CHOLECYSTECTOMY

59. Ans. a. Diabetes (Ref: Blumgart 5/e p486, 513; Shackelford 7/e p1316)

DIABETES MELLITUS (BLUMGART 5/e p486)

- Patients with diabetes may have a **higher incidence of gallstones**^Q from the **indirect effects** of the **metabolic syndrome**, **obesity**, and a **family history of gallstones**^Q.
- **No data show worse evolution of asymptomatic cholelithiasis in diabetics**^Q, and **prophylactic cholecystectomy in asymptomatic gallstones carriers with diabetes is not recommended**^Q

Indications of Prophylactic Cholecystectomy

- | | |
|---|--|
| <ul style="list-style-type: none"> • Cardiac transplant recipients^Q • Lung transplant recipients^Q • Chronic TPN requirement^Q • Recipients of biliopancreatic diversion^Q (bariatric patient) • Children with hemoglobinopathy^Q (sickle cell, thalassemia and spherocytosis) • Asymptomatic gallstone ≥3 cm^Q • Stone associated with the polyp | <ul style="list-style-type: none"> • Family history of GB cancer and asymptomatic stones^Q • Cholelithiasis encountered during elective abdominal procedures^Q • Non-functioning GB^Q • Typhoid carrier with positive bile culture^Q • Trauma to GB^Q • Porcelain GB |
|---|--|

- Many **heart/lung transplant** recipients use **cyclosporine** as maintenance immunotherapy; **chronic cyclosporine use**^Q (>2 years) has been associated with the prevalence of **gallstones**.

60. Ans. c. Multiple GB polyps (Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p1122; Blumgart 5/e p751; Shackelford 7/e p1364)

61. Ans. a. Diabetes

62. Ans. b. Mucocoele of the gallbladder, e. Symptomatic cholelithiasis

63. Ans. a. Erich Muhe (Ref: Blumgart 5/e p512)

HISTORY OF LAPAROSCOPIC CHOLECYSTECTOMY

- Dr. Kurt Semm, the **father of "pelviscopy,"** performed the **first laparoscopic appendectomy** in 1980^Q.
- **Eric Muhe**^Q performed the **first laparoscopic cholecystectomy** in 1982. He used a **modified operating laparoscope** placed at the umbilicus after establishing pneumoperitoneum.
- In 1987, **Phillipe Mouret** performed the **first video laparoscopic cholecystectomy** by using a **camera attached to the laparoscope**^Q.

64. Ans. d. Adenomyomatosis

- Cholecystectomy is indicated in **symptomatic adenomyomatosis** or when **cholelithiasis** is present^Q.

65. Ans. a. Calcified GB

66. Ans. d. Observation (Ref: Blumgart 5/e p524-525)

- "A **small amount of biliary drainage** following cholecystectomy should cause **no alarm** because it **usually disappears within 1 or 2 days**^Q. However, **excessive biliary drainage** through the wound or drain site, **jaundice**, **sepsis** or a **combination of these events early in the post-operative period** should suggest a **bile duct injury**, as should **copious biliary drainage for more than few post-op days**^Q."

67. Ans. b. Porcelain gallbladder, c. Asymptomatic with history of single attack of acute pancreatitis, e. Symptomatic cholecystitis

68. Ans. a. Clotting factor deficiency (Ref: Blumgart 5/e p514)

Contraindications to Laparoscopic Cholecystectomy

Absolute	Relative
<ul style="list-style-type: none"> • Unable to tolerate general anesthesia^Q • Refractory coagulopathy^Q • Suspicion of carcinoma^Q 	<ul style="list-style-type: none"> • Previous upper abdominal surgery^Q • Cholangitis^Q • Diffuse peritonitis^Q • Cirrhosis or portal hypertension^Q • Chronic obstructive pulmonary disease • Cholecystenteric fistula^Q • Morbid obesity^Q • Pregnancy^Q

Indications of Open Cholecystectomy

- | | |
|--|--|
| <ul style="list-style-type: none"> Poor pulmonary or cardiac reserve^Q Cirrhosis and portal hypertension^Q Combined procedure | <ul style="list-style-type: none"> Suspected or known gallbladder cancer^Q Third-trimester pregnancy^Q |
|--|--|

69. Ans. d. All of the above

70. Ans. d. 55-years old with an asymptomatic gallstone

Boundaries of Callot's Triangle

- Superiorly, **cystic artery**^Q
- Medially, **common hepatic duct**^Q
- Laterally, **cystic duct**^Q

Boundaries of Hepatocystic Triangle

- Superiorly, **inferior surface of liver**^Q
- Medially, **common hepatic duct**^Q
- Laterally, **cystic duct**^Q

71. Ans. c. Laparoscopic cholecystectomy immediately (Ref: Sabiston 19/e p1487-1488; Schwartz 9/e p1148, 10/e p1325; Bailey 25/e p1121; Blumgart 5/e p488-489; Shackelford 7/e p1316)

TREATMENT OF ACUTE CHOLECYSTITIS

- Early cholecystectomy performed within 2 to 3 days (within 72 hours)^Q of presentation is preferred over interval or delayed cholecystectomy that is performed 6 to 10 weeks after initial medical therapy.
- Laparoscopic cholecystectomy is the preferred approach to patients with acute cholecystitis^Q.

72. Ans. a. Starts from fundus (Ref: Mastery of Surgery 5/e p1128)

Types of Cholecystectomy**Retrograde**

- Hilar structure dissection occurs first followed by the removal of gallbladder in the triangle of Callot's^Q.

Antegrade or Fundus-first or Top-down

- Separates GB from the liver before the cystic duct and artery are ligated^Q
- Considered safer because it allows for the progressive demonstration of the anatomy down to the infundibulocystic junction^Q.

73. Ans. c. No surgery for gallbladder stones (Ref: Blumgart 5/e p486)

- "There was no clear cost benefit and no life-years were gained from prophylactic cholecystectomy, indicating no clear-cut advantages of prophylactic cholecystectomy in asymptomatic cholelithiasis. As a result, in patients with asymptomatic gallstones, expectant management is recommended^Q."

74. Ans. a. Observation

75. Ans. a. Typical "sea-green" colored, b. Wall is thin and elastic

HEALTHY GALLBLADDER

- Greenish blue or sea green color^Q
- Thin and elastic wall^Q
- Can be emptied by squeezing^Q

76. Ans. a. Shrunk liver

77. Ans. a. Colon (Ref: Maingot 11/e p628)

- Bile acids can induce hyperproliferation of the intestinal mucosa^Q via a number of intracellular mechanisms.
- Cholecystectomy, which alters the enterohepatic cycle of bile acids, has been associated with a moderately increased risk of proximal colon cancers^Q.
- It cannot be ruled out, however, that it is less the effect of the cholecystectomy than the impact of other, not yet identified factors in the lithogenic bile of such patients.
- A number of cofactors have been identified that may enhance or neutralize the carcinogenic effects of bile acids, e.g. the amount of dietary fat, fiber, or calcium^Q.
- Calcium, in fact, binds bile acids and thus may reduce their negative impact^Q.

78. Ans. b. Decreased incidence of bile duct injuries

BILE DUCT INJURY

- Most benign strictures follow iatrogenic bile duct injury^Q
 - Most commonly during laparoscopic cholecystectomy^Q
 - Incidence of bile duct injury during open cholecystectomy is 0.1–0.2%^Q
 - Incidence of bile duct injury during laparoscopic cholecystectomy is 0.3–0.85%^Q
- Morbidity rate, hospital stay, and time to return to work are lower in patients undergoing laparoscopic cholecystectomy than open cholecystectomy^Q.

79. Ans. a. Laparoscopic cholecystectomy

In the given question, there was an episode of jaundice, but **at present**, LFT is **normal** and CBD is **not dilated**. The best option is **laparoscopic cholecystectomy** only.

Management of CBD Stones Associated with GB Stones	
• Pre-operatively Detected Stones	• Unsuspected stones found at the time of Cholecystectomy
Experienced Laparoscopic Surgeon	Experienced Laparoscopic Surgeon
• Cholecystectomy and choledochotomy in same sitting ^Q	• Laparoscopic CBD exploration and stone retrieval through the cystic duct ^Q • Laparoscopic choledochotomy and stone extraction ^Q
Inexperienced Laparoscopic Surgeon	Inexperienced Laparoscopic Surgeon
• Pre-op ERCP with stone removal and laparoscopic cholecystectomy later ^Q .	• Convert to open procedure and remove CBD stone ^Q • Complete the cholecystectomy and refer the patient for ERCP ^Q
<div>Conversion to an open procedure is preferred over ERCP^Q, because the success rate of ERCP is not 100%^Q.</div>	

80. Ans. b. Tube cholecystostomy

- If patients are unfit for surgery, percutaneous, ultrasound guided, or CT guided cholecystostomy is the treatment of choice^Q.

81. Ans. c. Wait and Watch

FLATULENT DYSPESIA

- Flatulent dyspepsia is usually described as **symptom of Gallstone disease**^Q.
- However, **flatulent dyspepsia** (in an otherwise **normal female**), that **responds to PPI** is **more likely** to result from **reflux or peptic ulcer disease** (rather than Gallstone disease) and **does not require surgical management or invasive investigations**^Q for gallbladder disease.
- Patients with these symptoms **should be observed (wait and watch)**^Q or investigated by **endoscopy to exclude reflux or peptic ulcer disease**^Q.

82. Ans. a. Just before operation

The question is incomplete. It should be "A cirrhotic patient with abnormal coagulation needs cholecystectomy, FFP should be given."

FRESH FROZEN PLASMA

- Transfusions with FFP are given to **replenish clotting factors**^Q.
- The **effectiveness** of the **transfusion** in maintaining hemostasis is **dependent on** the **quantity** of each factor delivered and its **half-life**.
- The **half-life** on the **most stable clotting factor**, factor VII, is **4 to 6 hours**^Q.
- A reasonable transfusion scheme would be to **give FFP on call** to the **operating room**.
- This way the **transfusion** is **complete prior** to the **incision**, with **circulating factors** to **cover the operative and immediate postoperative period**^Q.

ACALCULOUS CHOLECYSTITIS

83. Ans. a. Distended GB is seen in scintigraphy (Ref: Sabiston 19/e p1501-1502; Schwartz 9/e p1154, 10/e p1327-1330; Bailey 26/e p1108, 25/e p1122; Blumgart 5/e p491-492; Shackelford 7/e p1315-1316)

- Cholescintigraphy demonstrates **absent gallbladder filling** in **acalculous cholecystitis**^Q.

ACALCULOUS CHOLECYSTITIS

- Acute **inflammation of gallbladder without stones**^Q
- Accounts for 5-10% of all patients of acute cholecystitis
- **More fulminant course**^Q than the acute calculous cholecystitis.
- **More commonly progresses to gangrene, empyema, or perforation**^Q.
- **Visceral ischemia** is common in acute acalculous cholecystitis and may explain the high incidence of GB gangrene.

Predisposing Factors

- Elderly and **critically ill patients after trauma**^Q
- Burns^Q

- Long-term TPN^Q
- Major operations (abdominal aneurysm repair and cardiopulmonary bypass^Q)

Etiopathogenesis

- Exact etiology is not clear

- GB stasis and ischemia^Q have been implicated as causative factors.

- Stasis (disturbed micro-circulation) is common in critically ill patients not being fed enterally and may lead to colonization of the GB with bacteria^Q.
- Decreased arteriolar and capillary filling is present in contrast with the dilatation of these vessels in acute calculous cholecystitis.

Clinical Features

- Similar to acute calculous cholecystitis^Q.
- Patients may present with only unexplained fever, leucocytosis and hyperamylasemia and right upper quadrant tenderness^Q.
- If untreated, rapid progression to gangrene and perforation^Q may occur.

Diagnosis

- Ultrasonography is the diagnostic test of choice^Q, especially because it can be done at the bed side.
- Cholescintigraphy demonstrates absent gallbladder filling

Treatment

- Emergency cholecystectomy^Q for stable^Q patients
- Because of high incidence of gangrene, perforation and empyema, open cholecystectomy^Q is often the preferred approach.

Percutaneous Cholecystostomy

- If patients are unfit for surgery, percutaneous, ultrasound guided, or CT guided cholecystostomy is the treatment of choice^Q.
- About 90% patients improve with percutaneous cholecystostomy.

84. Ans. b. Malaria

- Both malaria and dengue are uncommon causes of acalculous cholecystitis.
- Malaria^Q seems to be more common between the two.

85. Ans. a. DM, b. TPN, c. Leptospirosis (Ref: Harrison 18/e p2622)

Causes of Acalculous Cholecystitis	
Common Causes	Uncommon Causes
<ul style="list-style-type: none"> • Elderly and critically ill patients after trauma^Q • Burns^Q • Longterm TPN^Q • Major operations (abdominal aneurysm repair and cardiopulmonary bypass^Q) • Diabetes mellitus 	<ul style="list-style-type: none"> • Vasculitis • Obstructing GB adenocarcinoma • GB torsion • Parasitic infestation • Unusual bacterial infection: • Leptospira^Q • Streptococcus • Salmonella • Vibrio cholera

86. Ans. a. Diabetes mellitus, b. Total parenteral nutrition

87. Ans. d. Cholecystectomy is not indicated

88. Ans. b. Schistostoma

XANTHOGRANULOMATOUS CHOLECYSTITIS

89. Ans. d. Associated with tuberculosis (Ref: www.medscape.com/viewarticle/449665)

XANTHOGRANULOMATOUS CHOLECYSTITIS

- XGC: Inflammatory disease characterized by a focal or diffuse destructive inflammatory process with lipid-laden macrophages^Q

Pathology

- Inflammatory response to extravasated bile, possibly from ruptured Rokitansky-Aschoff sinuses^Q.
- Presence of hypoechoic nodules or bands in thickened GB wall^Q together with calculi (cholesterol or mixed gallstones) in patient of chronic disease.
- There is extension of yellow tissue into adjacent organs, fistulae from GB to skin or duodenum may develop, may be mistaken for cancer^Q.

XANTHOGRANULOMATOUS CHOLECYSTITIS

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Pathology

- Inflammatory response to **extravasated bile**, possibly from **ruptured Rokitansky-Aschoff sinuses**^Q.
- Presence of **hypoechoic nodules or bands** in **thickened GB wall**^Q together with calculi (cholesterol or mixed gallstones) in patient of chronic disease.
- There is **extension of yellow tissue** into **adjacent organs**, **fistulae** from GB to **skin** or **duodenum** may develop, may be **mistaken for cancer**^Q.

Clinical Features

- Similar to acute cholecystitis

Diagnosis

- Thickening of GB wall is **most common radiological finding**, sometimes presence of **hypoattenuated bands**^Q.

Treatment

- Surgical treatment (**Laparoscopic cholecystectomy**) remains **the most effective and feasible option** for XGC

EMPHYSEMATOUS CHOLECYSTITIS

90. Ans. c. *Clostridium perfringens* (Ref: *Sabiston 19/e p1487; Blumgart 5/e p492*)

EMPHYSEMATOUS CHOLECYSTITIS

- Thought to begin with acute cholecystitis (calculous or acalculous), followed by ischemia or gangrene of GB wall and **infection by gas producing organisms**^Q.
- Occur most frequently in **elderly men** and patients with **diabetes mellitus**^Q.
- **Gallstones** are observed in **28–80% of patients with emphysematous cholecystitis**
- Emphysematous cholecystitis in the presence of acalculous cholecystitis is well established.

Causative organisms of Emphysematous Cholecystitis

- **Anaerobes:** *Cl. welchii* or *Cl. perfringens* (MC)^Q
- **Aerobes:** *E. coli*^Q

Clinical Features

- The clinical manifestations are essentially indistinguishable from those of non-gaseous cholecystitis.

Diagnosis

- The **diagnosis** is usually made on **abdominal X-ray**^Q
- **Abdominal X-ray findings:** Gas within the **GB lumen**, dissecting within GB wall to form a **gaseous ring** or in **pericholecystic tissues**^Q.

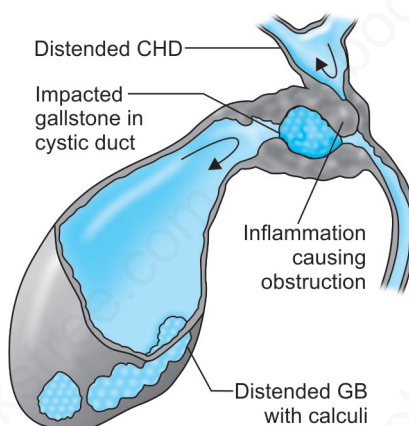
Treatment

- The morbidity and mortality rates with emphysematous cholecystitis are considerable.
- **Prompt surgical drainage** coupled with appropriate **antibiotics** is mandatory^Q.
- **Cholecystectomy** is **best treatment** of complicated acute cholecystitis^Q.
- **Unstable patients:** **Percutaneous cholecystostomy** under **LA**^Q can be performed to drain GB.

91. Ans. d. It is caused most commonly by *Pseudomonas*

MIRIZZI'S SYNDROME

92. Ans. b. Erosion of one-third circumference of common duct (Ref: *Sabiston 19/e p1503; Schwartz 9/e p1147, 1156, 10/e p1320-1331; Blumgart 5/e p493; Shackelford 7/e p1370*)



MIRIZZI'S SYNDROME (FUNCTIONAL HEPATIC SYNDROME)

- It is defined as **obstruction** of the **common hepatic duct** or **CBD** by **external compression** or by **erosion** of stone in the **Hartmann pouch** or **cystic duct**^Q.
- **External compression** has been classified as **type 1** whereas **erosion** as **type 2** Mirizzi syndrome by **McSherry**^Q.
- **Csendes** subclassified type 2 into three categories based on the percentage of the wall of CBD eroded by offending calculus.

Csendes Classification of Mirizzi's Syndrome	
Type I	Obstruction of common duct by external compression only (no erosion) ^Q
Type II	Erosion of less than one-third circumference of common duct ^Q
Type III	Erosion of up to two-third circumference of common duct ^Q
Type IV	Total/near total circumferential destruction of common duct ^Q
Type V	Erosion of GB in common duct with cholecystoenteric fistula

Treatment

Type I	Partial cholecystectomy ^Q
Type II and Type III	Partial cholecystectomy leaving behind a cuff of gallbladder for reconstruction of bile duct (choledochoplasty) with T-tube drainage ^Q
Type IV and V	Bilioenteric anastomosis ^Q

- Stenosis of the **biliary tree** often resolves **spontaneously** in the **post-operative period**, and **choledochotomy** is **seldom indicated**^Q.

93. Ans. a. GB stone compressing common hepatic duct

STRAWBERRY GALLBLADDER

94. c. Diffuse deposition of cholesterol in mucosa of gallbladder (Ref: Bailey 26/e p1108, 25/1122)

STRAWBERRY GALLBLADDER (CHOLESTEROLOSIS)

- It is an **acquired**^Q histologic abnormality of the gallbladder epithelium that results in an **excessive accumulation** of lipid (**cholesterol esters** and **triglyceride**)^Q within epithelial macrophage of the GB wall.
- **Cholesterol stones** are found in **half** of the cases^Q.

Pathology

- **Gross Appearance:** The mucosa has **pale, yellow streaks** running longitudinally giving rise to the term **strawberry gallbladder**^Q (although the mucosa is usually bile stained rather than red).
- **Diffuse form** ("strawberry gallbladder"): **GB mucosa** is **brick red** and speckled with **bright yellow flecks** of lipid^Q.
- **Localized form:** **Solitary** or **multiple "cholesterol polyps"** studding the gallbladder wall^Q.

Treatment

- **Cholecystectomy** is indicated in **symptomatic cholesterosis** or when **cholelithiasis** is present^Q.

GALLBLADDER POLYP AND ADENOMYOMATOSIS

95. Ans. c. >3 in number (Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p1122; Blumgart 5/e p751; Shackelford 7/e p1364)

Polypoid Lesions of the Gallbladder	
Cholesterol polyps	Adenomatous polyp
<ul style="list-style-type: none"> • Cholesterol polyps are the most common^Q • Usually <10 mm in size^Q • Have a characteristic echogenic pedunculated^Q appearance on USG • Multiple (30% of cases)^Q 	<ul style="list-style-type: none"> • Adenomatous polyp has malignant potential^Q. • Adenoma may be difficult to distinguish from adenocarcinoma of GB • Main differentiating feature is a lack of transmural invasion on USG^Q • Risk factors associated with malignancy: <ul style="list-style-type: none"> – Age > 60 years^Q – Coexistence of gallstones^Q – Documented increase in size^Q – Size > 10 mm^Q

96. Ans. c. Size >5 mm (Ref: Sabiston 19/e p1505)

97. Ans. c. Size of polyp > 5 mm

98. Ans. a. Adenomyomatosis < 1 cm, pedunculated

99. Ans. a. Adenomyomatosis (Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p751, 1122; Shackelford 7/e p1364)

GALLBLADDER ADENOMYOMATOSIS

- Adenomyomatosis is a benign condition characterized by **hyperplastic changes**^Q of unknown etiology involving the GB wall.
- It causes **overgrowth of mucosa, thickening of muscular wall**, and **formation of intramural diverticula or sinus tracts** termed as **Aschoff-Rokitansky sinuses**^Q.
- These **sinuses** may contain **cholesterol crystals**^Q.
- The disease can be **focal or diffuse**.
- It has **no malignant potential**^Q.

Diagnosis

- **USG**: The presence of cholesterol crystals in these sinuses can result in **"diamond ring sign"**^Q, **"V-shaped"**^Q, or **"comet-tail"** artifacts^Q on USG.

- Adenomyomatosis appears as a **sessile polyp** with characteristic **microcysts** on USG and is often **>10 mm**^Q.
- **Cholecystography** is more specific for diagnosis.

Treatment

- **Cholecystectomy** is indicated in **symptomatic adenomyomatosis** or when **cholelithiasis** is present^Q.

100. Ans. b. Adenomyomatosis

GALL BLADDER CARCINOMA PREDISPOSING FACTORS

101. Ans. d. 90% association (Ref: Blumgart 5/e p742)

- **Cholelithiasis** is seen in **75–98%** of all patients with CA GB^Q.
- The **incidence of CA GB** in a population of **patients with gallstones** is from **0.3–3%**^Q.

102. Ans. d. Biliary ascariasis (Ref: Blumgart 5/e p742)

Risk Factors for Carcinoma Gallbladder	
<ul style="list-style-type: none"> • Gallstones >3 cm^Q • Porcelain gallbladder^Q • Anomalous pancreatobiliary junction^Q • Choledochal cysts^Q 	<ul style="list-style-type: none"> • Adenomatous polyps^Q • Primary sclerosing cholangitis^Q • Obesity^Q • Salmonella typhi infection^Q

103. Ans. c. Clonorchis sinensis (Ref: www.ncbi.nlm.gov/pubmed/3993073)

CLONORCHIS SINENSIS

- Clonorchis sinensis is a **liver fluke**, acquired by **ingestion of raw or inadequately cooked freshwater fishes**^Q.
- In human body, it **lives within bile ducts** and causes **inflammatory reaction** leading to **cholangiohepatitis** and **biliary obstruction**^Q.
- It is a well known **risk factor for cholangiocarcinoma**^Q.
- It is a **rare**, but **mentioned risk factor for carcinoma gallbladder**^Q.

104. Ans. b. Choledochal cysts, d. Calcification of gallbladder, e. Gallstone

105. Ans. a. Adenomyosis

106. Ans. d. Oral contraceptives

107. Ans. a. Porcelain gallbladder (Ref: Sabiston 19/e p1481, 1506; Schwartz 9/e p1143, 10/e p1317-1318; Bailey 26/e p1116, 25/e p1122; Blumgart 5/e p742; Shackelford 7/e p1364)

PORCELAIN GALLBLADDER

- Porcelain GB is characterized by **extensive calcium encrustation** of GB wall^Q.
- The term porcelain gallbladder has been used to emphasize the **blue discoloration** and **brittle consistency** of GB wall at surgery^Q.

Pathology

- **Calcium salt deposition** within the wall of a **chronically inflamed gallbladder**^Q

Clinical Features

- Most porcelain GB (90%) are **associated with gallstones**^Q.
- Mean **age** of patients is **54 years** (38–70 years).
- Patients are usually **asymptomatic** and the condition is usually **found incidentally** on **plain abdominal radiographs**, sonograms or CT images.
- **High frequency** association (10%) is with **GB adenocarcinoma**^Q.

- **Surgery** should not be delayed even if the patient is asymptomatic, because the occurrence of carcinoma is remarkably high.

Diagnosis

- In porcelain GB, **plain radiographic findings** are usually **straight forward**^Q.
- **CT scan** is **diagnostic** in cases of **doubt**

Treatment

- **Cholecystectomy** in **all patients**^Q with porcelain GB (high incidence of development carcinoma GB)

108. Ans. d. Always denotes benign etiology

CARCINOMA GALLBLADDER

109. Ans. a. Conservative and follow up (Ref: Sabiston 19/e p1505-1508; Schwartz 9/e p1160-1162, 10/e p1334-1335; Bailey 26/e p1116-1117, 25/e p1129; Blumgart 5/e p748-754; Shackelford 7/e p1364-1370)

CARCINOMA GALLBLADDER

- **Highest incidence** of CA GB in **India and Pakistan**^Q
 - More common in **women** of **6th and 7th decade**^Q
 - **Cholelithiasis** is seen in **75–98%** of all patients with CA GB^Q.
 - The **incidence** of CA GB in a population of **patients with gallstones** is from **0.3–3%**^Q.
 - CA GB is an **aggressive malignancy** with **poor prognosis**^Q
 - **Nevin classification**^Q is used for **CA GB staging**.
- **Calcified GB** is associated with cancer in **10–25%**^Q of cases.
 - **Helicobacter pylori** and **H. bilis** demonstrated to **increase the risk of CA GB** by **6 fold**^Q.
 - **Increased risk of CA GB** in **FAP** and **HNPCC**^Q.

- **MC gene mutation** in CA GB: **p53>K-ras>BRAF**^Q
- **MC mode of CA GB spread**: **Direct invasion**^Q into the adjacent organs.

Pathology

- **MC Site**: **Fundus (60%)**^Q > **Body (30%)** > **Neck (10%)**
- **Histological types**:
 - **Diffuse Infiltrative**: MC type^Q
 - **Nodular or mass forming**
 - **Papillary**: Exhibits **polypoid** or cauliflower appearance and have **best prognosis**^Q.
- **Adenocarcinoma**^Q is the **MC histologic subtype** of CA GB.
- In CA GB: **Direct hepatic invasion** in **59%**^Q, **LN metastasis** in **45%**, **perineural invasion** in **42%** cases

Clinical Features

- Most commonly presents with **RUQ pain** often **mimicking cholecystitis** and **cholelithiasis**^Q.
- **Weight loss, jaundice**, and an **abdominal mass** are less common presenting symptoms.
- **Chronic cholecystitis** with a **recent change in quality or frequency of the painful episodes** in **40%** patients^Q
- Malignant biliary obstruction with jaundice, weight loss, and RUQ pain

Diagnosis

- **USG** is **first diagnostic modality**^Q used in evaluation of patients with **RUQ pain**.

- **USG**: A **heterogeneous mass replacing the GB lumen** and an **irregular gallbladder wall**^Q
 - **CT Scan**: **Mass replacing the gallbladder (MC finding)**; **focal or diffuse gallbladder wall thickening**; and an **intraluminal polypoidal mass**^Q

- **Typical cholangiographic finding**: **Long stricture of the common hepatic duct**^Q.
- Triple phase CT is used to identify hepatic arterial or portal venous involvement.
- **Unresectable or incurable CA GB**: **Percutaneous biopsy** or **FNAC** for **confirmatory tissue diagnosis**^Q

Tumor Markers

- **Best tumor marker** for CA GB is **CA19-9**^Q (CA19-9 >20 U/ml-75% of sensitivity and specificity).
- **CEA >4 ng/ml** is associated with **93% specificity** but **50% sensitivity**.

7th AJCC: TNM Classification of Carcinoma Gallbladder

T1a	Lamina propria invasion ^Q
T1b	Muscular invasion ^Q
T2	Invasive the perimuscular connective tissue ^Q
T3	Serosal perforation and/or direct invasion of the liver (regardless of extent) and/or invasion of any other single extrahepatic organ ^Q .

7th AJCC: TNM Classification of Carcinoma Gallbladder	
T4	Tumor invades the main portal vein, hepatic artery or two or more extrahepatic organ ^Q
N1	Metastasis to nodes along cystic duct, common bile duct, hepatic artery, and/or portal vein ^Q
N2	Metastasis to periaortic, pericaval, superior mesenteric artery, and/or celiac artery LNs ^Q
M1	Distant metastasis

7th AJCC: TNM Staging of CA GB	
Stage I	T1 N0 M0
Stage II	T2 N0 M0
Stage IIIA	T3 N0 M0
Stage IIIB	T1-3 N1 M0
Stage IVA	T4 N0-1 M0
Stage IVB	Tany N2 M0 Tany Nany M1

TREATMENT OF CARCINOMA GALLBLADDER

- Gallbladder cancer: Incidental pathological finding after Laparoscopic cholecystectomy
- T1a** with **negative cystic duct margin**: No further therapy^Q
- T1a** with **positive cystic duct margin**: **Re-resection of cystic duct or CBD** to negative margin^Q
 - T1b, T2, T3** tumor with no evidence of metastasis: **Re-resection, extended cholecystectomy** (possible CBD or extended hepatic resection)^Q
- T4**: **Extended cholecystectomy with extended right hepatectomy**^Q
- N2 or M1** disease: **Clinical trial** (chemoradiation or chemotherapy) in good performance status^Q
- Laparoscopic **trocar site scars** are **excised for staging purposes** to identify **M1** disease than for any potential therapeutic benefit^Q.

Pre-operatively diagnosed CA GB

- T2, T3**: **Extended cholecystectomy**^Q
- T4 N0**: **Extended cholecystectomy with extended right hepatectomy**^Q
- N1 or hilar invasion**: **Extended cholecystectomy with CBD resection**^Q
- N2 or M1**: **Clinical trial** (chemoradiation or chemotherapy) in good performance status, **palliative care** in poor performance status^Q

Surgical Technique

- For patients suspected of having resectable gallbladder cancer, begin **surgical exploration with laparoscopy**, in the absence of disseminated disease, proceed with open laparotomy.
 - Extended cholecystectomy** consists of **cholecystectomy with en bloc resection** of segments **IVB and V**; including **lymphadenectomy** of the **cystic duct, pericholedochal, periportal, and posterior pancreaticoduodenal and local intraaortocaval lymph nodes**.
- During a **standard cholecystectomy** the **serosa** of the gallbladder is **typically opened** and the avascular subserosal layer is used as the surgical plane of dissection.
- In case of **suspected carcinoma** the **plane of dissection** is along the **cystic plate** of the liver to avoid violation of the gallbladder subserosa.
- Only 15% of patients develop **loco-regional recurrence** while most (85%) had **recurrence** involving a **distant site**.

Gallbladder cancer with Obstructive Jaundice

- Percutaneous external biliary drainage** offers a minimally invasive and effective means of palliation.

INDICATIONS FOR REPEAT OPERATIVE INTERVENTION IN CA GB DIAGNOSED INCIDENTALLY AFTER LAPAROSCOPIC CHOLECYSTECTOMY

- Pathologic analysis identifies **T2** or **greater** degree invasion^Q
- Cystic duct **margins** are **positive**^Q
- Presence of intra-operative **bile spillage**^Q

UNRESECTABLE CARCINOMA GALLBLADDER

- Median survival** for patients presenting with unresectable disease is **2-4 months** with **1-year survival** is less than 5%^Q.
- Goal of palliation is to relieve jaundice, pain, bowel obstruction and prolongation of life.
- Percutaneous stents** are effective for **relieving jaundice** and should be used, as expected survival does not usually warrants a surgical bypass^Q.
- Gemcitabine plus cisplatin (Reference regimen)** is used for **palliation** of **unresectable disease**^Q.

110. Ans. a. Follow-up
 111. Ans. a. 4–6 months
 112. Ans. d. III
 113. Ans. a. T1a can be treated and cured by laparoscopic cholecystectomy
 114. Ans. a. Adenocarcinoma
 115. Ans. d. Pancreaticoduodenectomy has 5 year survival of 25%
 116. Ans. b. 90% are associated with gallstones
 117. Ans. a. Papillary
 118. Ans. d. Excision of port sites improves survival

- Port site excision is done for staging purposes to identify M1 disease^Q
- Port site excision is **not** having any potential therapeutic benefit^Q.

119. Ans. b. Extended cholecystectomy (Ref: Blumgart 5/e p754)

- T1b, T2, T3 tumor with no evidence of metastasis: Re-resection, **extended cholecystectomy** (possible CBD or extended hepatic resection)^Q
 - **Extended cholecystectomy** consists of **cholecystectomy with en-bloc resection** of segments IVB and V; including **lymphadenectomy** of the **cystic duct, pericholedochal, periportal, and posterior pancreaticoduodenal and local intraaortocaval lymph nodes.**

PORT SITE RECURRENCES (BLUMGART 5TH/754)

- There is a **theoretical risk** of **port site seeding** after **laparoscopic cholecystectomy** for what is eventually diagnosed as **gallbladder cancer**. This problem may be exacerbated by **spillage of bile or stones inside the peritoneal cavity**.
- One study looked at 409 patients who underwent laparoscopic cholecystectomy for presumed benign gallbladder disease but were diagnosed with gallbladder cancer on final pathology. Seventeen percent of patients at a median of 180 days were diagnosed with laparoscopic port site recurrences. As a result of this high percentage, **some surgeons recommend port site excision during reoperation for gallbladder cancer**.
- It is important to note, however, that it is **rare for port site recurrences to occur** as the **sole site of disease**.
- Given that it is **more a marker of aggressive disease than a single site of resectable disease**, **our general practice does not include empirically resecting prior port sites during reexploration for gallbladder cancer**.

120. Ans. a. Adenocarcinoma
 121. Ans. a. Chronic cholesterol stone, c. Chronic gallbladder disease, e. Porcelain gallbladder
 122. Ans. c. Radical cholecystectomy
 123. Ans. b. Present with jaundice, d. Gallstones predispose
 124. Ans. c. Secondaries to liver

METASTASIS IN CARCINOMA GALLBLADDER

- Direct hepatic invasion in 59%^Q, LN metastasis in 45%, perineural invasion in 42% cases.

125. Ans. a. Adenocarcinoma
 126. Ans. b. Extended cholecystectomy
 - T1b, T2, T3 tumor with no evidence of metastasis: Re-resection, **extended cholecystectomy** (possible CBD or extended hepatic resection)^Q
 127. Ans. b. Gallstones may be a predisposing factor

GALLBLADDER ANATOMY AND PHYSIOLOGY

128. Ans. a. 5, b. 10 (Ref: Sabiston 19/e p1476-1478; Schwartz 9/e p1136, 10/e p1309-1310; Bailey 26/e p1097-1098, 25/e p1111-1112; Blumgart 5/e p43; Shackelford 7/e p1288-1290)

GALLBLADDER: ANATOMY AND PHYSIOLOGY

- It is lined by a single, highly-folded, **tall columnar epithelium**
- The **mucus** originates in the **tubuloalveolar glands**^Q found in the mucosa lining the infundibulum and **neck**, but are **absent** from the **body** and **fundus**.
- It is **covered** by the **serosa** except where it is embedded in the liver
 - GB lacks a **muscularis mucosa** and **submucosa**^Q.
- Normal capacity of the gallbladder is 30–50 mL^Q.
- Mucosa contain **crypt of Luschka**^Q.

Cystic Duct

- The **cystic duct** usually measures **2–4 cm** in length and contains prominent **concentric folds** known as the **spiral valves of Heister**^Q.
- The cystic duct frequently exhibits a **tortuous** or **serpentine course**^Q.
- Diameter of the cystic duct ranges from **1–5 mm**.
- Mucosa of the cystic duct is arranged in spiral folds known as **valves of Heister**^Q surrounded by a sphincteric structure called **sphincter of Lutkans**^Q.

- **Cystic artery** is nearly found within the **Hepatocystic triangle**^Q, the area bound by the cystic duct, common hepatic duct and the liver margin.
- GB mucosa has the **greatest absorptive capacity**^Q per unit of any structure in the body
- **Hartmann's pouch** is an **acquired diverticulum**^Q of the infundibulum or **neck** of the gallbladder.

Functions of Gallbladder

- Reservoir of bile
- **Concentration of bile 5-10 times**^Q
- Secretion of **mucus, 20 mL/per day** by tubuloalveolar glands
- **Acidification of bile**

GALLBLADDER ANATOMY AND PHYSIOLOGY

129. Ans. d. 50

130. Ans. d. Lymph node of Lund

Important Lymph Nodes

• Rotter's nodes ^Q	• Interpectoral nodes (CA breast) ^Q
• Rouvier nodes ^Q	• Retropharyngeal nodes (CA Nasopharynx) ^Q
• Delphian nodes ^Q	• Pre-cricoid lymph nodes ^Q
• Irish nodes ^Q	• Nodes in left axilla (CA stomach) ^Q
• Sister Mary Joseph nodes ^Q	• Periumbilical metastatic cutaneous nodules
• Virchow nodes ^Q	• Left supraclavicular node ^Q
• Cloquet node ^Q	• Femoral canal node ^Q
• LN of Lund ^Q	• Cystic lymph node ^Q
• Krause LN ^Q	• Jugular fossa LN ^Q

MISCELLANEOUS

131. Ans. b. Choledochoduodenostomy (Ref: Blumgart 5/e p632; Shackelford 7/e p1355)

SUMP SYNDROME

- **Sump syndrome**: Particulate matter, stones, and food debris accumulate and stagnate in the distal, "blind" end of the common duct^Q
- **Sump syndrome** occurs after **choledochoduodenostomy**^Q
- Occasional cause of **recurrent cholangitis** that can result in anastomotic stricture

Management

- Endoscopic management, consisting of **sphincterotomy** with or without **balloon dilation** of the **anastomosis**^Q
- **End-to-side hepaticojejunostomy, Roux-en-Y**, to prevent persistent regurgitation of intestinal contents and to **remove the "sump"** permanently, is preferred surgical procedure^Q.

132. Ans. b. Re-cholecystectomy is the definite treatment of choice, e. Oral ursodeoxycholic acid relieves symptoms remarkably (Ref: Sabiston 19/e p1499)

POSTCHOLECYSTECTOMY SYNDROME

- The **remnant of the cystic duct or gallbladder** (in subtotal cholecystectomy) has historically been implicated as the **source of pain, nausea, and vomiting** in postcholecystectomy patients^Q
- An **increase in choledochal pressure** resulting in **cystic stump distension, inflammation** or **stone obstruction** within the **remnant of the cystic duct or gallbladder**^Q, and an increase in the sphincter of Oddi pressure have all served as causes of postcholecystectomy problems

- However, various studies have confirmed that **symptomatic improvement** only occurs when a stone is present in the CBD or cystic duct and is **subsequently removed endoscopically or via operative reintervention**^Q.

- In general, **persistent symptoms following a cholecystectomy** in which no cholangiogram was performed warrants analysis of the **liver function profile** and/or **noninvasive imaging** with either **ultrasound** or **MRCP** to **assess for retained stone**
- If **CBD stone** are present, **therapeutic ERCP** is suggested^Q.

133. Ans. c. 4 sphincters (Ref: Shackelford 7/e p1290; Bailey 26/e p1120)

- The **entire sphincter mechanism** is actually composed of **four sphincters**^Q containing both **circular** and **longitudinal smooth muscle fibers**.

SPHINCTER OF ODDI

- The **entire sphincteric system** of the **distal bile duct** and the **pancreatic duct** is commonly referred to as the **sphincter of Oddi**.
- The sphincter mechanism functions **independently** from the surrounding **duodenal musculature** and has **separate sphincters** for the **distal bile duct**, the **pancreatic duct**, and the **ampulla**.
- In **more than 90%** of the population, the **common channel**, where the biliary and pancreatic ducts join, is **<1.0 cm** in length and lies within the ampulla.

The four sphincters are

- | | |
|--|--|
| 1. Superior sphincter choledochus ^Q | 3. Sphincter pancreaticus ^Q |
| 2. Inferior sphincter choledochus ^Q | 4. Sphincter of the ampulla ^Q |

134. Ans. a. Pressing the artery manually (Ref: Blumgart 5/e p525)

GOLDEN RULES TO BE FOLLOWED IN CASE OF DIFFICULT CHOLECYSTECTOMY

- When the **anatomy of Callot's triangle** is **not clear**, **blind dissection should not be done**^Q
- **Bleeding adjacent** to the **Callot's triangle** should be **controlled by pressure** and not by clipping or clamping^Q
- When there is **doubt about the anatomy**, a **fundus first cholecystectomy** dissecting on gallbladder wall down to the cystic duct can be helpful^Q.
- If the **cystic duct** is **densely adherent** to **CBD** and there is possibility of **Mirizzi's syndrome**, the **infundibulum** of the GB should be **opened**, the **stone removed** and **infundibulum oversewn**^Q.

135. Ans. c. Like toothpaste emulsion in the gallbladder (Ref: Harrison 18/e p2622)

LIMEY BILE

- **Calcium salts** in the lumen of the GB in sufficient concentration may produce **calcium precipitation** and **diffuse, hazy opacification** of bile or a **layering effect** on plain abdominal X-ray^Q.
- Filled with a mixture of **calcium carbonate** and **calcium phosphate** usually, the consistency of toothpaste^Q
- Caused by **gradual obstruction** of the **cystic duct** or **CBD** by chronic pancreatitis or carcinoma pancreas^Q.
- **Organisms** are **rarely grown** from emulsion.

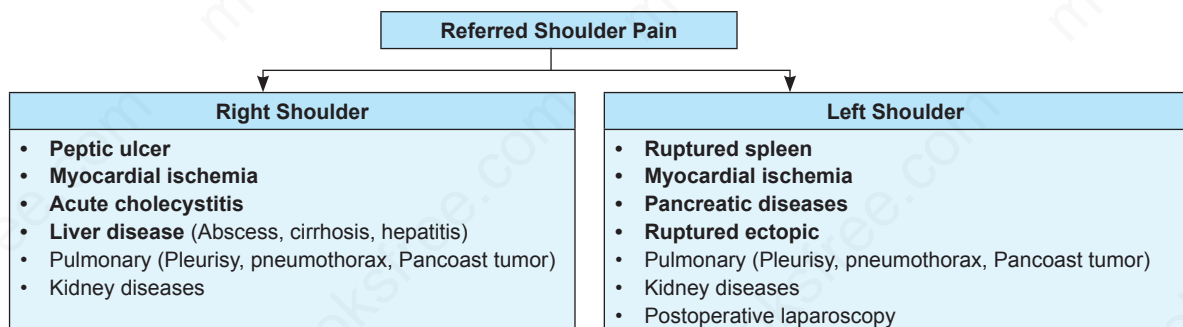
Diagnosis

- Best revealed on **plain radiography**^Q

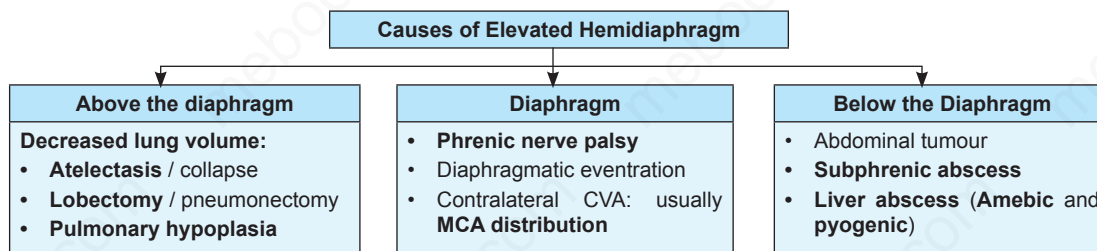
Treatment

- **Limey bile**, or **milk of calcium bile**, is usually **clinically innocuous**^Q
- **Cholecystectomy** is recommended when it occurs in a **hydropic gallbladder**^Q.

136. Ans. d. Appendicitis (Ref: Examination of Shoulder by Tae Kyun Kim/4)



137. Ans. b. Acute cholecystitis (Ref: Sabiston 19/e p1440-1447, 1487-1488; Schwartz 9/e p1115-1116; <http://radiopaedia.org/articles/elevated-hemidiaphragm>)



IMPORTANT TOPICS

Composition of Bile		
Characteristic	Hepatic Bile	GB Bile
Na ⁺	160.0	270.0
K ⁺	5	10
Cl ⁻	90	15
HCO ₃ ⁻	45	10
Ca ²⁺	4	25
Mg ²⁺	2	—
Bilirubin	1.5	15
Protein	150	—
Bile acids	50	150
Phospholipids	8	40
Cholesterol	4	18
Total solids	—	125
pH	7.8	7.2

- The **inorganic solute** has a **concentration in bile** that is **similar to plasma** and account for the bile **osmolality** of 300 mOsm/kg.

COURVOISIER'S SIGN

- A **palpable, non-tender gallbladder**^Q
- Usually results from a **distal common duct obstruction** secondary to a **peripancreatic malignancy**^Q

PHRYGIAN CAP

- This **anomaly** is the **most common** of the gallbladder^Q
- Created by an **infolding** of a **septum** between the **body** and the **fundus**^Q
- GB functions normally, and this anomaly is **not an indication** for **cholecystectomy**^Q.

MOYNIHAN'S HUMP (CATERPILLAR'S TURN)

- **Most dangerous anomaly** (for cholecystectomy)
- Right hepatic artery takes a **tortuous turn**

Bile Duct

MULTIPLE CHOICE QUESTIONS

CHOLEDOCHAL CYST

- Choledochal cyst in intrahepatic biliary tree:
 - I
 - II (AIIMS GIS Dec 2006)
 - IVa
 - IVb
- Caroli's disease is: (AIIMS GIS Dec 2006)
 - Type I choledochal cyst
 - Type III choledochal cyst
 - Type IV choledochal cyst
 - Type V choledochal cyst
- According to Alonso-Lej classification, type IVb is:
 - Both extra and intra-hepatic duct dilatation
 - Extra-hepatic duct dilatation (JIPMER GIS 2011)
 - Intra-hepatic duct dilatation
 - Sub-hepatic duct dilatation
- True about Todani's modification of Alonso-Lej classification include the following except? (MHSSMCET 2008)
 - Type I = saccular dilation of common bile duct
 - Type II = diverticulum of supraduodenal bile duct
 - Type IVa = choledochocoele
 - Type IVb = multiple saccular dilations of extrahepatic ducts only
- Most commonly seen choledochal cyst: (PGI May 2011)
 - Type I
 - Type II
 - Type III
 - Type IVa
 - Type V
- Saccular diverticulum of extrahepatic bile duct in choledochal cyst is classified as:
 - Type I
 - Type II (COMEDK 2009)
 - Type III
 - Type IV
- Reconstructive surgery for choledochal cyst is not done in: (MHSSMCET 2009)
 - Type I
 - Type II
 - Type III
 - Type IV
- Choledochal cyst: (AIIMS GIS 2003)
 - Resection decreases the incidence of malignancy but risk persists
 - 80% cases have stones
 - Treated by Roux-en-Y cystojejunostomy
 - Type IV is most common
- Treatment of choice in choledochal cyst: (AIIMS GIS 2003)
 - Roux-en-Y hepaticojunctionostomy
 - Cystojejunostomy
 - Choledochoduodenostomy
 - Choledochojunctionostomy
- A 10 years female presents with pain in the right hypochondrium, fever, jaundice and a palpable mass in the right hypochondrium the probable diagnosis is: (COMEDK 2011)
 - Hepatitis
 - Hepatoma
 - Choledochal cyst
 - Mucocele gallbladder
- Central dot sign is seen in: (AIIMS May 2011, Nov 2008) (ILBS 2012)
 - Primary sclerosing cholangitis
 - Liver Hamartoma
 - Caroli's disease
 - Polycystic liver disease
- True about choledochal cyst is: (WBPG 2015, AIIMS Sep 96)
 - Always extrahepatic
 - Treatment is cystojejunostomy
 - Excision is ideal treatment
 - Drainage is treatment of choice
- Not true regarding choledochal cyst: (AIIMS Nov 95)
 - Epigastric mass
 - Jaundice
 - Pain in abdomen
 - Cystojejunostomy is treatment of choice
- In case of choledochal cyst, bile diversion into the small intestine is not done because of the risk of:
 - Malignancy
 - Pancreatitis
 - Recurrent cholangitis
 - Gallstones
- Clinical features of choledochal cyst in adult are: (UPSC 2004)
 - Pain, lump and intermittent jaundice
 - Pain, fever and intermittent jaundice
 - Pain, lump and progressive jaundice
 - Pain, fever and progressive jaundice
- Choledochal cyst develops due to: (DNB 2006)
 - Stenosis of sphincter
 - Dysfunction of long circular fibre
 - Congenital
 - Iatrogenic
- Choledochal cyst: (DPG 2006)
 - Mostly presents in adulthood
 - Excision is infrequently done
 - Presents as slowly progressive jaundice
 - Can lead to carcinoma
- Not true about choledochal cyst is: (AIIMS May 2009)
 - Associated with anomalous junction of the pancreatic and biliary duct
 - Type II is most common
 - Surgical removal is the treatment of choice
 - If ruptures can cause biliary peritonitis

19. Multiple intrahepatic bile duct dilation with bile lakes and concurrent sepsis is suggestive of: (MHSSMCET 2006)
- Caroli's disease
 - Watson Algali syndrome
 - Primary sclerosing cholangitis
 - Klatskin tumor

CHOLIDOCHOLITHIASIS AND CHOLANGITIS

20. The procedure of choice for elective removal of CBD stones for most patients is: (COMEDK 2006)
- Open choledocholithotomy
 - Endoscopic papillotomy
 - Laparoscopic choledocholithotomy
 - Percutaneous choledocholithotomy
21. The Reynold's pentad of fever, jaundice, right upper quadrant pain, septic shock and mental status change is typical of: (COMEDK 2008)
- Cholangitis
 - Hepatitis
 - Cholecystitis
 - Pancreatitis
22. Association of choledocholithiasis in cholangitis: (GB Pant 2011)
- <5%
 - 15%
 - 20–35%
 - 50%
23. All are true about CBD stones except: (AIIMS GIS 2003)
- Associated with GB stones in 10% cases
 - Primary stones are usually brown
 - Laboratory values may be normal in one third cases of choledocholithiasis
 - Retained stones are discovered after 2 years of cholecystectomy
24. Recurrent stone of 2.5 cm in CBD presented with cholangitis. Treatment: (KGMC 2011)
- ESWL
 - Lithotripsy
 - Supraduodenal choledochotomy
 - Duodenostomy
25. Which of the following calculi are rare in gallbladder, but common in common bile duct? (MHPGMCET 2008)
- Cholesterol stone
 - Brown stone
 - Black stone
 - None
26. What is the treatment of choice for recurrent CBD stones with multiple strictures in common bile duct?
- Hepaticojejunostomy
 - Cutaneous hepaticojejunostomy
 - Cholecystectomy
 - ERCP and sphincterotomy
27. Treatment of CBD stone includes: (PGI May 2010)
- Endoscopic papillotomy
 - ERCP
 - Ursodeoxycholic acid
 - Hepaticojejunostomy
 - Choledochotomy
28. Charcot's triad: (Recent Question 2014, JIPMER 2010, All India 96, 95)
- Fever, abdominal pain, jaundice
 - Fever, vomiting, jaundice
 - Fever, jaundice, abdominal distension
 - Fever, diarrhea, jaundice
29. Sphincterotomy of sphincter of Oddi is performed at: (DNB 2006)
- 3'O clock position
 - 6'O clock position
 - 9'O clock position
 - 11'O clock position
30. CBD stone may present with: (PGI Dec 2002)
- Increased bilirubin
 - ↑WBC count
 - ↑liver enzymes
 - Fever with rigors
 - Hepatomegaly
31. Most common cause of cholangitis: (AIIMS June 94)
- Viral infection
 - CBD stone
 - Surgery
 - Amebic infection
32. A patient of post-cholecystectomy biliary stricture has undergone an ERCP three days ago. Following this, she has developed acute cholangitis. The most likely organism is: (All India 2006)
- Escherichia coli
 - Bacillus fragilis
 - Streptococcus viridians
 - Pseudomonas aeruginosa
33. Which of the following statements is true regarding cholangitis? (PGI Dec 2001)
- Increased leucocyte count
 - Increased transaminases
 - Increased alkaline phosphatase
 - Association with fever and chills
34. Not a feature of CBD stone: (AIIMS June 98)
- Pain
 - Fever
 - Jaundice
 - Septic shock
35. A 50-years old woman presented with history of recurrent episodes of right upper abdominal pain for the last one year. She presented to casualty with history of jaundice and fever for 4 days. On examination, the patient appeared toxic and a blood pressure of 90/60 mmHg. She was started on intravenous antibiotics. Ultrasound of the abdomen showed presence of stones in the common bile duct. What would be the best treatment option for her? (AIIMS Nov 2003)
- ERCP and bile duct stone extraction
 - Laparoscopic cholecystectomy
 - Open surgery and bile duct stone extraction
 - Lithotripsy
36. What is more appropriate for diagnosis of CBD stones?
- Ultrasonography
 - ERCP
 - OCG
 - IV cholangiography
37. A patient having multiple gallstones and shows 8 mm dilation and 4 stones in CBD. Best treatment modalities are: (PGI Dec 2002)
- Cholecystectomy with choledocholithotomy at same setting
 - ESWL
 - Cholecystectomy and wait for ERCP
 - Sphincterotomy and then cholecystectomy
 - Cholecystectomy and after 14 days sphincterotomy done
38. Best treatment modality for common bile duct stone is: (AIIMS Nov 94)
- Endoscopic sphincterotomy
 - Observation
 - Chenodeoxycholic acid
 - Percutaneous removal
39. The treatment of choice for an 8 mm retained common bile duct (CBD) stone is: (DNB 2011, AIIMS May 2005, Nov 2003)
- Laparoscopic CBD exploration
 - Percutaneous stone extraction
 - Endoscopic stone extraction
 - Extracorporeal shock wave lithotripsy
40. A patient presented 1 year after cholecystectomy with a CBD stone of 2.5 cm in size. Treatment of choice is: (AIIMS Nov 97, All India 99)
- Supraduodenal choledochotomy with exploration
 - Transduodenal choledochojunostomy

- c. Transduodenal sphincterotomy
- d. Endoscopic sphincterotomy with stone extraction

41. Which one of the following statement is incorrect regarding stone in the common bile duct? (All India 2006)

- a. Can present with Charcot's triad
- b. Are suggested by a bile duct diameter >6 mm of ultrasound
- c. ERCP, sphincterotomy and balloon clearance is now the standard treatment.
- d. When removed by exploration of the common bile duct the T-tube can be removed after 3 days

42. Treatment for common bile duct stone is by: (PGI Dec 2001)

- a. ESWL
- b. Exploration of bile duct and recovery of stones
- c. Bile duct stenting
- d. Nasobiliary drainage
- e. Percutaneous drainage

43. Absolute indication for choledochotomy: (PGI June 2006)

- a. Gallstone ileus
- b. Gallstone pancreatitis
- c. Fever
- d. Jaundice
- e. Palpable CBD stone

44. Ramu presents with recurrent attacks of cholelithiasis, USG examination shows a dilated CBD of 1 cm. The next line of management is: (AIIMS June 2001)

- a. ERCP
- b. PTC
- c. Cholecystostomy
- d. Intravenous cholangiogram

45. Most common surgical cause of obstructive jaundice:

(AIIMS Nov 94, AIIMS Nov 96, All India 98, 2000)

- a. Periapillary carcinoma
- b. Carcinoma gallbladder
- c. Carcinoma head of pancreas
- d. CBD stones

46. What is more appropriate for diagnosis of CBD stones?

- a. Ultrasonography
- b. ERCP (PGI 97)
- c. OCG
- d. IV cholangiography

47. In cholangiography CBD stone appears as:

- a. Meniscus sign (AIIMS June 98)
- b. Cut off sign
- c. Slight flow of dye from the sides
- d. Ability to absorb water

48. Common bile duct stones will manifest all except:

(MCI March 2008, All India 89)

- a. Distended gallbladder
- b. Jaundice
- c. Itching
- d. Clay colored stools

49. In cholangitis, the organism mostly responsible is: (PGI 88)

- a. E. coli
- b. Streptococcus
- c. E. histolytica
- d. Clostridium

50. An ultrasound examination shows dilated intrahepatic biliary channels with a small gallbladder. The most likely possibility is: (DPG 2010, Karnataka 94)

- a. Gallbladder stone
- b. Pancreatic calculus
- c. Common bile duct stone
- d. Carcinoma of the head of the pancreas

51. The most common cause of suppurative cholangitis is:

(UPPG 97)

- a. Stone in common bile duct
- b. Cancer of the ampulla of Vater
- c. Choledochal cyst
- d. Empyema of gallbladder

52. The procedure of choice for elective removal of CBD stones for most patients is: (Karnataka 2006)

- a. Open choledocholithotomy
- b. Endoscopic choledocholithotomy
- c. Laparoscopic choledocholithotomy
- d. Percutaneous choledocholithotomy

53. Which of the following is not a component of Reynolds' Pentad in toxic cholangitis? (DPG 2009 March)

- a. Right upper quadrant pain
- b. Confusion
- c. Septic shock
- d. Markedly elevated transaminases

54. Best treatment of acute suppurative cholangitis is:

(DPG 2006)

- a. Laparoscopic cholecystectomy
- b. Open cholecystectomy
- c. Endoscopic papillotomy
- d. Choledochotomy

55. Leucine aminopeptidase is elevated in obstruction of:

- a. Ureter
- b. Urethra (BHU 88)
- c. Common bile duct
- d. Spermatic cord

56. All of the following are seen with bile duct stone except:

(MCI March 2008)

- a. Obstructive jaundice
- b. Distended and palpable gallbladder
- c. Pruritus
- d. Clay colored stools

57. Management of stone in CBD includes following except:

(PGI Nov 2011)

- a. Observation
- b. Laparoscopic CBD exploration
- c. Medical dissolution of stone
- d. Endosphincteric removal

CHOLEDOCHOTOMY AND CBD EXPLORATION

58. A surgeon with less experience of laparoscopic cholecystectomy while doing laparoscopic surgery found some stone in CBD. What should he ideally do?

(AIIMS Nov 2011, AIIMS GIS Dec 2010)

- a. Open cholecystectomy with choledochoduodenostomy
- b. Lap CBD exploration and stone removal
- c. Lap CBD extraction through the cystic duct
- d. Convert to open cholecystectomy and CBD stone removal

59. Choledochotomy is indicated in all of the following except in patients with:

(COMEDK 2010)

- a. Palpable CBD stones
- b. History of jaundice or cholangitis
- c. Abnormal alkaline phosphatase
- d. Abnormal gamma glutamyl transferase

60. Best suture for common bile duct is:

(JIPMER 95)

- a. Synthetic absorbable
- b. Synthetic non-absorbable
- c. Non-synthetic absorbable
- d. Non-synthetic non-absorbable

61. After exploration of common bile duct, the T-tube is removed on which of the following days:

(Karnataka 96)

- a. 3rd postoperative day
- b. 4th postoperative day
- c. 12th postoperative day
- d. 6th postoperative day

62. Cholangiography via T-tube done after how many days of cholecystectomy:

(TN 99)

- a. 1-5 days
- b. 5-9 days
- c. 10-14 days
- d. 15-20 days

63. After cholecystectomy a 2.5 cm calculus was found in CBD, treatment for this should be: (MHSSMCET 2006)
- Supraduodenal choledochotomy
 - Transduodenal choledochotomy
 - Dormia basket removal
 - Choledochotomy and T tube
64. A retained stone impacted in distal common bile duct is seen on T-tube cholangiogram. What is the best management of stone? (UPSC 2004)
- Dissolution therapy
 - Operative removal
 - Endoscopic sphincterotomy and stone extraction
 - No active treatment is required
65. Most common complication of common bile duct exploration: (DPG 2008)
- Retained stone
 - Pancreatitis
 - Stricture of common bile duct
 - T-tube displacement
66. Endoscopic sphincterotomy is not successful in the following except? (MHSSMCET 2008)
- Multiple duodenal diverticuli
 - Choledocholithiasis
 - Billroth type II Gastrostomy
 - None
67. ERCP failure occurs in following except? (MHSSMCET 2008)
- Smaller stone in CHD
 - Stenosis of papilla
 - High stricture
 - Malignant obstruction

BILE DUCT INJURY AND BILIARY STRICTURES

68. All are true about bile duct injury except: (AIIMS GIS 2003)
- Incidence is equal in laparoscopic and open cholecystectomy
 - After experience of 20 cases, bile duct injury rate decreases
 - Errors leading to laparoscopic bile duct injuries stem from misperception, not errors of skill, knowledge or judgment
 - Primary cause of error in most of the cases is visual perceptual illusion
69. False about CBD injury: (AIIMS GIS May 2008)
- Incidence in open cholecystectomy is 0.1-0.2%
 - Incidence in laparoscopic cholecystectomy is 0.5-0.8%
 - After 20 cases of laparoscopic cholecystectomy incidence of bile duct injury decreases
 - Most common reason for bile duct injury is lack of techniques and errors of judgment
70. Biliary stricture developing after laparoscopic cholecystectomy usually occurs at which part of common bile duct? (Punjab 2008, All India 2006)
- Upper
 - Middle
 - Lower
 - All with equal frequency
71. According to Strasberg classification, lateral CBD injuries are classified as: (JIPMER GIS 2011)
- Type B
 - Type C
 - Type D
 - Type E
72. According to Strasberg classification, transection of aberrant right hepatic duct without ligation is:
- Type A
 - Type B
 - Type C
 - Type D
73. According to Bismuth Strasberg classification of bile duct injury, causing occlusion of a branch of biliary tree would be which type? (MHSSMCET 2010)
- Type A
 - Type B
 - Type C
 - Type D
74. Strasberg's class 'B' bile injury means: (MHSSMCET 2010)
- Bile leak from a minor duct
 - Occlusion of a branch of biliary tree
 - Injury of bile duct not in communication with CBD
 - Circumferential injury to major bile ducts
75. In Strasberg Classification of bile duct injury, type C is? (MHSSMCET 2008)
- Bile leak form a minor duct still in continuity with CBD
 - Injury form bile duct not in communication with CBD
 - Sectoral duct injury with consequent leak
 - Circumferential injury to major bile ducts
76. Bile duct strictures are seen in: (PGI Dec 2008)
- CBD stone
 - Cholangiocarcinoma
 - Chronic pancreatitis
 - Trauma
 - Acute pancreatitis
77. According to the Bismuth/Strasberg classification, cystic blow out is classified as:
- Type A
 - Type B
 - Type C
 - Type D
78. A 40-years old patient has undergone an open cholecystectomy. The procedure was reported as uneventful by the operating surgeon. She has 100 ml of bile output from the drain kept in the gallbladder bed on the first post operative day. On examination she is afebrile and anicteric. The abdomen is soft and bowel sounds are normally heard. As an attending physician, what should be your best possible advice: (AIIMS Nov 2003)
- Order an urgent endoscopic retrograde cholangiography and biliary stenting
 - Urgent laparotomy
 - Order an urgent hepatic imino diacetic acid scintigraphy (HIDA)
 - Clinical observation
79. On 7th postoperative day after laparoscopic cholecystectomy, patient developed right upper abdominal pain and 10 cm × 8 cm collection. Treatment consists of: (PGI Dec 2003)
- Immediate laparotomy
 - Percutaneous drainage
 - Laparotomy and surgical exploration of bile duct and T-tube insertion
 - Laparoscopic cystic duct ligation and percutaneous drainage
 - Roux-en-Y loop hepaticojejunostomy
80. On 5th postoperative day after laparoscopic cholecystectomy, a 50 years old lady presented with right upper quadrant pain with fever and 12 cm subhepatic collection on CT and ERCP shows cystic duct leak. The best management is: (PGI June 2003)
- Immediate laparotomy
 - Percutaneous drainage of fluid
 - Laparotomy and surgical exploration of bile duct and T-tube insertion
 - Laparoscopic cystic duct ligation and percutaneous drainage
 - Roux-en-Y loop hepaticojejunostomy
81. 5 days after CBD surgery there is a small leak. What will be the best treatment? (AIIMS June 98)
- Ultrasound guided aspiration
 - ERCP and stenting
 - Re-exploration and hepaticojejunostomy
 - Re-exploration and primary repair

82. The initial investigation of choice for a post cholecystectomy biliary stricture is: (AIIMS May 2005)

- Ultrasound scan of the abdomen
- Endoscopic cholangiography
- Computed tomography
- Magnetic resonance cholangiography

83. Regarding bile duct injuries following cholecystectomy which of the following statement is false? (AIIMS Nov 2005)

- The incidences following open cholecystectomy is in the range of 0.2 to 0.3%
- The incidence rate following laparoscopic cholecystectomy is three times higher than the rates following open cholecystectomy
- Untreated cases may develop secondary biliary cirrhosis
- Routine use of 'open' technique of laparoscopic port insertion has resulted in a decline in the incidence of post laparoscopic cholecystectomy bile duct injuries

84. Common bile duct injuries are most commonly seen in: (UPSC 2008)

- Radical gastrectomy
- Penetrating injuries of abdomen
- ERCP and sphincterotomy
- Laparoscopic cholecystectomy operation

85. Most common cause of biliary stricture is: (AIIMS June 94)

- CBD stone
- Trauma
- Asiatic cholangitis
- Congenital

BILIARY FISTULA

86. Most common cause of gallbladder fistula is: (DPG 2008)

- Liver abscess aspiration
- Laparoscopic surgery
- Gallstones
- Trauma

87. Which does not contribute to enterobiliary fistula? (Punjab 2008)

- Gastric ulcer
- Duodenal ulcer
- Carcinoma gallbladder
- Gallstones

SPHINCTER OF ODDI DYSKINESIA

88. The ideal treatment of stenosis of sphincter of Oddi is:

- Transduodenal sphincteroplasty (SGPGI 2004)
- Endoscopic sphincteroplasty
- Choledochojunostomy
- Choledochoduodenostomy

BILIARY TRACT DISEASES

89. Vanishing bile duct syndrome is seen in: (PGI June 2003)

- Chronic viral hepatitis
- Sarcoidosis
- Lymphoma
- Non-cirrhotic portal fibrosis
- Alcoholism

90. Bile ductopenia seen in: (PGI Dec 2003)

- GVHD
- Alcoholic hepatitis
- Autoimmune hepatitis
- Cirrhosis
- Sclerosing cholangitis

BILIARY ATRESIA

91. Which of the following are histopathological features of Extra hepatic biliary atresia? (PGI June 2001)

- Bile lakes
- Hepatocyte ballooning degeneration

- Marked bile duct degeneration
- Fibrosis of hepatic duct
- Parenchymal cholestasis

92. The gold standard for the definitive diagnosis of the extrahepatic biliary atresia is: (AIIMS Nov 2002)

- Per-operative cholangiography
- Hepatobiliary scintigraphy
- Alkaline phosphatase level
- Liver biopsy

93. Better prognostic factor for operation of biliary duct obstruction in newborn are: (PGI June 2001)

- No passage of bile
- Size of ductule >200 micron
- Weight of baby >3 kg
- Preterm baby
- Age of 8 weeks

94. Kasai's procedure is the treatment of choice for:

- Congenital hypertrophic pyloric stenosis
- Duodenal atresia (NEET 2013 Orissa 2011)
- Biliary atresia
- Hirschprung's disease

PRIMARY SCLEROSING CHOLANGITIS

95. Association of PSC with all except: (ILBS 2012)

- UC
- ITP
- Sarcoidosis
- Retroperitoneal fibrosis

96. False about PSC: (AIIMS GIS May 2008)

- PSC in UC, the association is 30%
- Low incidence of cholangitis
- Increased incidence of colonic carcinoma in PSC + UC
- Despite the presence of diffuse disease, hepatic duct bifurcation is most severely strictured segment

97. A 50-years old male presents with pain upper abdomen, pruritus, jaundice and weight loss, elevated ANA, the likely diagnosis is: (COMEDK 2011)

- Primary sclerosing cholangitis
- Klatskin tumor
- Secondary sclerosing cholangitis
- Choledocholithiasis

98. Primary sclerosing cholangitis is likely to be associated with: (JIPMER 2012, 2011)

- Adenocarcinoma of pancreas
- Cholangiocarcinoma
- Hepatocellular carcinoma
- Adenocarcinoma of gallbladder

99. "Onion skin" fibrosis of bile duct is seen in: (COMEDK 2009)

- Primary biliary cirrhosis
- Primary sclerosing cholangitis
- Extrahepatic biliary fibrosis
- Congenital hepatic fibrosis

100. Regarding PSC, all are true except: (AIIMS GIS Dec 2010)

- Cholangiocarcinoma is always intrahepatic
- Management of PSC/UC does not alter the course of either disease
- Patients with PSC or UC have pancolitis on majority
- Patients with PSC or UC have more chances of CRC than UC alone

101. All are true about PSC except: (AIIMS GIS May 2011)

- Commonly affect 40-45 years of age
- More common in males

- c. Most patients presents with advanced disease
- d. Survival after diagnosis is 10–15 years

102. True about primary sclerosing cholangitis are all except:

- a. Fibrosing cholestasis of bile duct (PGI June 2005)
- b. Periductal onion skin fibrosis
- c. Cirrhosis never occurs
- d. Jaundice is seen
- e. Associated with UC

103. All of the following are true for patients of ulcerative colitis associated with primary sclerosing cholangitis, except:

- a. They may develop biliary cirrhosis (All India 2005)
- b. May have raised alkaline phosphatase
- c. Increased risk of hilar cholangiocarcinoma
- d. PSC reverts after a total colectomy

104. A patient presenting with history of diarrhea for several years with recent onset pruritus and raised alkaline phosphatase, normal SGOT/PT and USG shows no gallstones and biliary tract abnormality, the diagnosis is: (PGI June 2004)

- a. Hodgkin's Lymphoma
- b. Sclerosing cholangitis
- c. Autoimmune Hepatitis
- d. Viral Hepatitis

105. True regarding primary sclerosing cholangitis associated with ulcerative colitis are all of the following except:

- a. Biliary cirrhosis is a known complication (MCI March 2007)
- b. Increased risk of hilar cholangiocarcinoma
- c. May have raised levels of alkaline phosphatase
- d. Primary sclerosing cholangitis resolves after total colectomy

PRIMARY BILIARY CIRRHOSIS

106. Pruritus precedes jaundice in: (ILBS 2011)

- a. Primary biliary cirrhosis
- b. Secondary biliary cirrhosis
- c. Primary sclerosing cholangitis
- d. CBD stone

107. The earliest symptom in primary biliary cirrhosis is:

- a. Jaundice
- b. Pruritus
- c. Melanosis
- d. Vomiting (COMEDK 2008, 2007)

108. Two most important clinical features of primary biliary cirrhosis: (PGI June 2003)

- a. Generalized pruritus
- b. Jaundice
- c. Fatigue
- d. Clubbing
- e. Hematemesis

109. Which is not true about PBC? (APPG 2008)

- a. No increase in risk of hepatocellular carcinoma
- b. Often asymptomatic
- c. Elevated IgM
- d. Positive anti-mitochondrial antibody

110. Commonest presentation of primary biliary cirrhosis:

- a. Pruritus
- b. Pain (All India 98)
- c. Jaundice
- d. Fever

RECURRENT PYOGENIC CHOLANGITIS

111. All of the following are true regarding RPC except:

- a. Equal incidence in males and females
- b. More common in left lobe of liver
- c. All are pigmented stones (AIIMS GIS Dec 2010)
- d. GB stones are present in >50% cases

CHOLANGIOCARCINOMA PREDISPOSING FACTORS

112. Which of the following is not a risk factor for cholangiocarcinoma? (AIIMS GIS Dec 2011)

- a. Thorotrast
- b. Radon
- c. Dioxin
- d. Aflatoxin

113. Not a predisposing factor for cholangiocarcinoma:

- a. Asiatic cholangio-hepatitis (Punjab 2007)
- b. Cholelithiasis
- c. Ulcerative colitis
- d. Choledochal cyst

114. APBDJ is associated with: (AIIMS GIS 2003)

- a. Cholangiocarcinoma
- b. CA GB
- c. Choledochal cyst
- d. All of the above

115. Predisposing factor for cholangiocarcinoma?

- a. PSC (MHSSMCET 2009)
- b. Gallstones
- c. Ankylostomiasis
- d. All of the above

116. Cholangiocarcinoma has been associated with infection by:

- a. Paragonimus westermani (Recent Question 2015, COMEDK 2004)
- b. Clonorchis sinensis
- c. Loa Loa
- d. Schistosoma haematobium

117. Which of the following does not predispose to cholangiocarcinoma? (All India 96, AIIMS Feb 97)

- a. Ulcerative colitis
- b. Clonorchis sinensis
- c. Choledochal cyst
- d. Chronic pancreatitis

118. All of the following are known predisposing factors for cholangiocarcinoma except? (All India 97)

- a. CBD stones
- b. Clonorchis sinensis
- c. Ulcerative colitis
- d. Primary sclerosing cholangitis

119. An increased incidence of cholangiocarcinoma is seen in all of the following except? (All India 03)

- a. Hydatid cyst of liver
- b. Polycystic disease of liver
- c. Sclerosing cholangitis
- d. Liver flukes
- e. None

120. All the following increase risk for cholangio-carcinoma except: (DPG 2010)

- a. Ulcerative colitis
- b. Gallstones in CBD
- c. Sclerosing cholangitis
- d. Clonorchis

CHOLANGIOCARCINOMA

121. Non-resectability criteria in hilar cholangio-carcinoma are all except: (ILBS 2012)

- a. Involvement of secondary biliary radicals bilaterally
- b. Metastasis to celiac nodes
- c. Involvement of right branch of portal vein
- d. Contralateral involvement of bile duct

122. Type II cholangiocarcinoma involve: (DNB 2011)

- a. Division of both ducts and not extending outside
- b. Common hepatic duct only
- c. Secondary hepatic duct
- d. Extending beyond hilum

- 123. All are true about prognosis of cholangio-carcinoma except:**
- Scirrhus type has better prognosis than papillary
 - Major prognostic factors are margin status and tumor stage (AIIMS GIS 2003)
 - Bile duct resection alone is associated with high chances of recurrence
 - Curative resection includes hepatic resection + bile duct resection + lymphadenectomy

- 124. Klatskin tumor is:** (JIPMER 2010)
- Merkel cell carcinoma of skin
 - Primitive neuroectodermal tumor of chest wall
 - Common hepatic duct tumor
 - Adenocarcinoma of anal canal

- 125. Most common site of cholangiocarcinoma:** (AIIMS Nov 2011, May 2011, Nov 2008)
- Distal biliary duct
 - Hilum
 - Intrahepatic duct
 - Multifocal

- 126. True regarding cholangiocarcinoma:** (PGI SS Dec 2010)
- Sclerosing variety is most common
 - Multifocal in 40%
 - Jaundice typically precedes pruritus
 - Adjuvant therapy improves survival

- 127. Cholangiocarcinoma histologically resembles:** (AIIMS 79, DPG 79, 92)
- Squamous cell type
 - Colloid cell type
 - Scirrhus type
 - Columnar cell type

- 128. All are criteria of non-resectability in patients with hilar cholangiocarcinoma except:** (JIPMER GIS 2011)
- Hepatic duct involvement upto secondary radicals bilaterally
 - Encasement or occlusion of main portal vein proximal to its bifurcation
 - Atrophy of one lobe with encasement of contralateral portal vein branch
 - Atrophy of one lobe with ipsilateral involvement of secondary biliary radicals

- 129. Contraindication of resection in cholangio-carcinoma are all except:** (ILBS 2011)
- Involvement of main trunk of portal vein
 - Hepatic atrophy with contralateral bile duct encasement
 - Hepatic atrophy with contralateral portal vein encasement
 - Hepatic atrophy with ipsilateral bile duct involvement

- 130. ERCP is indicated for the following except:** (Recent Questions 2013)
- Distal CBD tumor
 - Hepatic porta tumor
 - Proximal cholangiocarcinoma
 - Gallstone pancreatitis

- 131. According to Bismuth classification, type IV cholangiocarcinoma involves:** (Recent Question 2015)
- Common hepatic duct
 - Bifurcation only
 - Bifurcation and bilateral secondary intrahepatic ducts
 - Bifurcation and unilateral secondary intrahepatic ducts

HEMOBILIA

- 132. Most common cause of hemobilia:** (DNB 2005, 2000, AIIMS GIS 2003)
- Trauma
 - Iatrogenic
 - Parasites
 - Tumors

- 133. Not true of hemobilia:** (DNB 2010, Punjab 2009, ComedK 2007)

- GI bleeding
- Fever
- Jaundice
- Colicky RUQ pain

- 134. A patient presents with abdominal pain, jaundice and melena. The Diagnosis is:** (All India 2000)

- Hemobilia
- Acute cholangitis
- Carcinoma gallbladder
- Acute pancreatitis

- 135. Cause of hemobilia are all except:** (AIIMS June 2000)

- Trauma to abdomen
- Malignancy
- Rupture of hepatic artery aneurysm
- Hepatitis

- 136. Triad of hemobilia includes all, except:** (NEET Pattern, AIIMS June 93)

- Pain
- Fever
- G.I. bleeding
- Jaundice

- 137. True regarding hemobilia:** (DPG 2007)

- Triad of jaundice, pain, melena
- MC cause- rupture of portal vein into biliary system
- MR angiography is the IOC
- None of the above

BILHEMIA

- 138. Best investigation for bilhemia is:** (JIPMER GIS 2011)

- ERCP
- MRCP
- CT
- EUS

- 139. All are true about bilhemia except:** (AIIMS GIS May 2008)

- Biliary pressure > portal pressure
- Diagnosed by ERCP
- Death due to embolism of bile in lungs
- Patient has hyperbilirubinemia with raised enzymes

MISCELLANEOUS

- 140. False statement about common bile duct:** (PGI May 2011)

- Lies in free margin of lesser omentum
- Anterior to first part of duodenum
- Right to hepatic artery
- Anterior to portal vein
- Open in second part of duodenum

- 141. True regarding common bile duct is all except:** (All India 2000)

- Opens 10 cm distal to the pylorus
- Lies anterior to I.V.C
- Portal vein lies posterior to it
- Usually opens into duodenum separate from the main pancreatic duct

- 142. Which of the following statement is true regarding the relation of bile duct?** (PGI Dec 2005)

- Posteriorly related to 1st part of duodenum
- Related posteriorly to the tunnel of pancreatic head
- Anteriorly related to 1st part of duodenum
- Related to IVC posteriorly
- It lies left to hepatic artery in the free border of lesser omentum

143. Predominant blood supply to the supraduodenal bile duct is derived from: (All India 2012)

- Vessels that run upward along the bile duct from the duodenal end of the duct such as the retroduodenal and gastroduodenal arteries
- Vessels that run downward along the bile duct from the hepatic end of the duct such as the right hepatic artery
- Vessels that arise from the hepatic artery proper run up along the CBD and supplies it with twigs in non-axial distribution
- Vessels that arise from the cystic artery

144. All of the following conditions are associated with pneumobilia except:

- | | |
|-----------------------|----------------------------|
| a. Sphincterotomy | b. Rupture of hydatid cyst |
| c. Mirizzi's syndrome | d. Gallstone ileus |

145. Pneumobilia is seen in: (DNB 2001)

- | | |
|--------------------|-----------------------|
| a. Gallstone ileus | b. Mirizzi's syndrome |
| c. TPN | d. Volvulus |

146. Normal length of CBD is: (DNB 2001)

- | | |
|---------|---------|
| a. 7 cm | b. 5 cm |
| c. 3 cm | d. 2 cm |

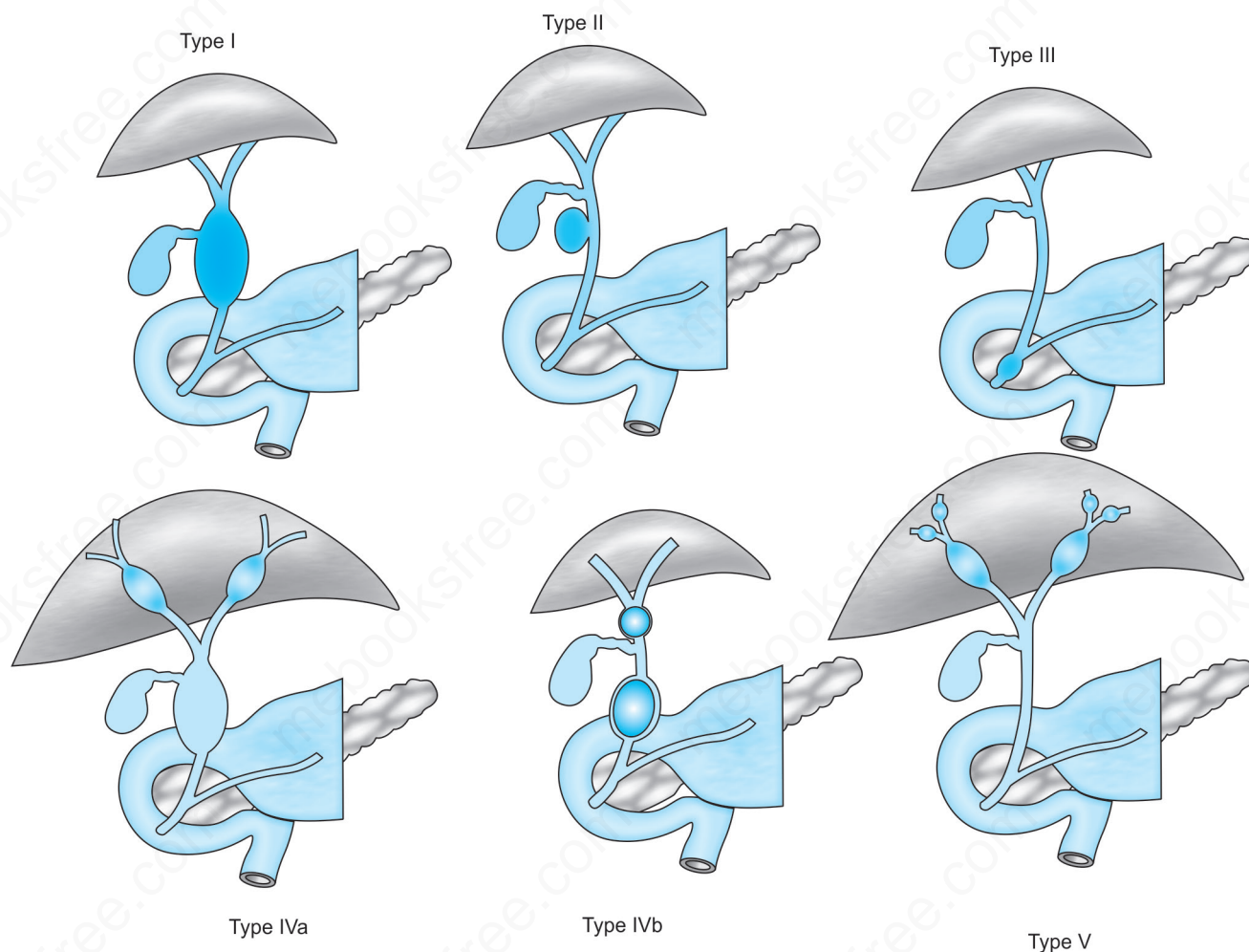
147. Which of the following is true regarding the principle of use of MRCP? (AIIMS Nov 2012)

- Intraluminal dye is used to create the three dimension view of the structures
- Dye is instilled percutaneously first then MRI is used
- Use of heavily T2-weighted image without contrast to create the three dimensional image of the biliary tree using MIP algorithm
- Use of systemic Gadolinium as a contrast agent to create the three dimensional image of the biliary tree

EXPLANATIONS

CHOLEDOCHAL CYST

1. Ans. c. IVa (Ref: Sabiston 19/e p1503-1505; Schwartz 9/e p1155, 10/e p1630; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p707-719; Shackelford 7/e p1397-1403)



Todani Modification of ALONSO-LEJ Classification

CHOLEDOCHAL CYST

- Cystic dilation of the biliary ducts, more common in **females**^Q
- Association of choledochal cyst with biliary atresia is seen, with **type 1 biliary atresia**^Q is present in most cases.
- It may be discovered on **antenatal ultrasound**^Q

Etiology

- Most widely accepted hypothesis: **Abnormal pancreaticobiliary ductal junction (APBDJ)**^Q
- APBDJ results in **reflux of pancreatic fluid** into the distal common hepatic duct and results in mucosal injury, chronic inflammation, and **weakening of the bile duct wall**^Q.

Classification

- Bile duct cysts are classified on the basis of site, extent, and shape of the cystic anomaly of the ductal system.
- MC choledochal cyst: **Type I > Type IV > Type III** (143)^Q

Todani Modification of Alonso-Lej Classification ^Q	
Type I	<ul style="list-style-type: none"> Dilation of the extrahepatic biliary tree Type Ia: cystic dilation^Q Type Ib: focal segmental dilation^Q Type Ic: fusiform dilation^Q
Type II	<ul style="list-style-type: none"> Diverticular dilation^Q of the extrahepatic biliary tree
Type III	<ul style="list-style-type: none"> Cystic dilation of the intraduodenal portion of the common bile duct (choledochoceles)^Q
Type IVA	<ul style="list-style-type: none"> Dilation of the extrahepatic and intrahepatic biliary tree^Q
Type IVB	<ul style="list-style-type: none"> Dilation of multiple sections of the extrahepatic bile ducts^Q
Type V	<ul style="list-style-type: none"> Dilation confined to the intrahepatic bile ducts (Caroli's disease)^Q

Clinical Features

- Classic triad: Pain, jaundice (intermittent) and abdominal mass (10%)^Q.

- MC symptom in Infants: Jaundice (in 80%)^Q
 - MC symptom in patients >2 years of age: Abdominal pain^Q
- In children, the major clinical symptoms are recurrent abdominal pain (81.8%), nausea and vomiting (65.5%), mild jaundice (43.6%), an abdominal mass (29.0%), and fever (29.0%).
- In adults, abdominal pain (87%) and jaundice (42%) are present frequently. Less common clinical findings include nausea (29%), cholangitis (26%), pancreatitis (23%), and an abdominal mass (13%).

Diagnosis

- IOC for choledochal cyst: MRCP (non-invasive)
- ERCP: More useful in defining the distal ductal anatomy and the presence of APBDJ
- PTC: Useful in defining the proximal ductal anatomy and the presence of intrahepatic disease.

Treatment of Choledochal Cyst	
Type I	<ul style="list-style-type: none"> Roux-en-Y hepaticojejunostomy^Q
Type II	<ul style="list-style-type: none"> Excision with T-tube repair^Q Roux-en-Y hepaticojejunostomy^Q
Type III	<ul style="list-style-type: none"> Endoscopic sphincterotomy and cyst unroofing^Q
Type IVA	<ul style="list-style-type: none"> Hepatic resection for localized disease^Q Liver transplantation for diffuse disease^Q
Type IVB	<ul style="list-style-type: none"> Transduodenal sphincteroplasty and Roux-en-Y hepaticojejunostomy^Q
Type V	<ul style="list-style-type: none"> Hepatic resection for localized disease^Q Liver transplantation for diffuse disease^Q

Complications of Choledochal Cyst	
<ul style="list-style-type: none"> Recurrent cholangitis^Q Pancreatitis^Q Gallstones^Q 	<ul style="list-style-type: none"> Cirrhosis with portal hypertension Portal vein thrombosis Malignancy^Q

LILLY TECHNIQUE

- Lilly technique: Serosal surface of the duct is left adhering to the portal vein, while the mucosa of the cyst wall is obliterated by curettage or cautery, when cyst is densely adhered to the portal vein secondary to long-standing inflammatory reaction^Q.
- In this situation, a complete, full-thickness excision of the cyst may not be possible.

2. Ans. d. Type V choledochal cyst (Ref: Sabiston 19/e p1504-1505; Schwartz 9/e p1119, 10/e p1289, 1630; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p717; Shackelford 7/e p1402-1403)

CAROLI'S DISEASE (TYPE V CHOLEDOCHAL CYST)

- Congenital malformation, consists of multiple **sacular dilations** limited to the **intrahepatic**^Q bile ducts (segmental bile ducts).
- About half the cases are associated with **congenital hepatic fibrosis**^Q (affect **interlobular** bile ducts).
- Cyst with congenital hepatic fibrosis is known as **Grumbach's disease**^Q.
- Portal hypertension is present in Caroli's disease associated with **congenital hepatic fibrosis**^Q.

Clinical Features

- Symptoms include **cholangitis** (64%)^Q, portal hypertension (22%), and abdominal pain (18%)
- More common in **males**
- Septa containing portal veins protrude into the lumen of the ectatic bile ducts (**central dot sign**)^Q.
- The main and often the only symptom of **bacterial cholangitis** secondary to **Caroli's disease** is **fever without abdominal pain and jaundice**.
- Frequent episodes of **cholangitis** indicates **poor prognosis**^Q.
- Most **stones** are **pigmented** in Caroli's disease.

Diagnosis

- **CT findings**: Portal vein radicals can be seen after enhancement within dilated intra-hepatic bile ducts (**central dot sign**)^Q.

Treatment

- **Hepatic resection** for **localized disease**^Q
- **Liver transplantation** for **diffuse disease**^Q.

3. Ans. b. Extra hepatic duct dilatation 4. Ans. c. Type IVa = choledochocoele 5. Ans. a. Type I
6. Ans. b. Type II 7. Ans. c. Type III
8. Ans. a. Resection decreases the incidence of malignancy but risk persists (Ref: Sabiston 19/e p1505; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p713; Shackelford 7/e p1399)

CARCINOMA IN CHOLEDOCHAL CYST

- **More than half** tumors occur within the cyst itself (**intracystic**) and **may recur after cyst excision**^Q.
- **Risk of malignancy** is **decreased** after **cyst excision**, but risk persist even after cyst excision (life long surveillance is required)
- Type I and IV cysts have the **highest risk of cancer**.
- When malignancy is present it is most commonly found along the **posterior cyst wall**^Q.
- Incidence of **cyst malignancy** is **age related**^Q.

Increased risk of following cancers	
<ul style="list-style-type: none"> • Biliary tree (MC)^Q • Gallbladder^Q • Liver^Q 	<ul style="list-style-type: none"> • Pancreas^Q • Duodenum^Q

- **Cholangiocarcinoma** is the **MC malignancy**^Q associated with bile duct cysts.

9. Ans. a. Roux-en-Y hepaticojejunostomy 10. Ans. c. Choledochal cyst 11. Ans. c. Caroli's disease
12. Ans. c. Excision is ideal treatment 13. Ans. d. Cystojejunostomy is treatment of choice
14. Ans. c. Recurrent cholangitis 15. Ans. a. Pain, lump and intermittent jaundice

CHOLEDOCHAL CYST

- **Classic triad**: Pain, jaundice (intermittent) and abdominal mass (10%)^Q.

16. Ans. c. Congenital 17. Ans. d. Can lead to carcinoma 18. Ans. b. Type II is most common
19. Ans. a. Caroli's disease

CHOLEDOCHOLITHIASIS AND CHOLANGITIS

20. Ans. b. Endoscopic papillotomy (Ref: Sabiston 19/e p1488-1491; Schwartz 9/e p1148, 10/e p1321-1322; Bailey 26/e p1111, 25/e p1125-1126; Blumgart 5/e p532-550; Shackelford 7/e p1326-1331)

- **ERCP**: **Diagnostic and therapeutic test of choice** for patients with suspected **CBD stones**^Q.

CHOLEDOCHOLITHIASIS

- **CBD stones** are classified by **point of origin**
- Found in **6-12%** of patients with **GB stones**^Q
- **Retained stones** discovered **within 2 years** of cholecystectomy^Q
- **Recurrent stones** detected **>2 years** following cholecystectomy^Q

Primary CBD stone	Secondary CBD stone
<ul style="list-style-type: none"> Formed within the biliary tract^Q Associated with biliary Stasis and infection^Q More commonly seen in Asian^Q populations Soft, friable, light-brown stones or sludge in the common duct^Q 	<ul style="list-style-type: none"> Formed initially in the GB^Q Migrate through the cystic duct into CBD^Q Most common bile duct stones in Western countries^Q Usually cholesterol stones^Q

Clinical Features

- CBD stones may be **silent** and are often **discovered incidentally**^Q. In these patients, biliary obstruction is transient, and laboratory tests may be normal.
- Clinical features suspicious for **biliary obstruction** due to **CBD stones** include **biliary colic**, **jaundice**, **clay colored stools**, and **darkening of the urine**^Q.
- Fever and chills** may be present in patients with choledocholithiasis and **cholangitis**.
- Serum **bilirubin** (>3.0 mg/dL), **aminotransferases**, and **ALP** are commonly elevated in patients with biliary obstruction but are **neither sensitive nor specific** for the presence of common duct stones.
- Among these, serum **bilirubin** has the **highest positive predictive value**^Q (28%–50%) for the presence of **choledocholithiasis**.
- Laboratory values** may be **normal** in **one third**^Q of patients with choledocholithiasis.

Diagnosis

- USG**: **First test**, can document **GB stones** and estimate the **CBD diameter**^Q
- A **dilated bile duct** (>8 mm in diameter) in a patient with **gallstones**, **jaundice** and **biliary pain** is **highly suggestive** of choledocholithiasis.
- MRCP**: Provides excellent anatomic detail, with **sensitivity** and **specificity** of 95% and 98%, respectively, for **CBD stones**^Q.
 - ERCP**: **Diagnostic and therapeutic test of choice** for patients with suspected **CBD stones**^Q.

Treatment

- Treatment options are **ERCP**, **laparoscopic** or **open CBD Exploration**.

21. Ans. a. Cholangitis (Ref: Sabiston 19/e p1500-1501; Schwartz 9/e p1149, 10/e p1322-1323; Blumgart 5/e p670-680; Bailey 26/e p1111, 25/e p1125-1126; Shackelford 7/e p1347, 1450)

CHOLANGITIS

- Ascending bacterial infection**^Q of the biliary ductal system with obstruction
- MC cause** of acute cholangitis is **choledocholithiasis**^Q
- MC organisms** present in the bile in patients with cholangitis: **E. coli**^Q, **Klebsiella pneumoniae**^Q, **Streptococcus faecalis**, and **Bacteroides fragilis**.

Etiology

- Choledocholithiasis (MC)**^Q
- Biliary-enteric anastomotic strictures**
- Benign strictures**
- Cholangiocarcinoma and periampullary cancer**

Clinical Features

- Characterized by **Charcot's triad**^Q: **Abdominal pain + jaundice + fever**
- Cholangitis may be either **self-limited** or **toxic with severe illness**, including **jaundice**, **fever**, **abdominal pain**, **mental status changes**, and **hypotension (Reynold's pentad)**^Q.

- Fever and chills** are the **MC presentation** (due to **cholangiovenous** and **cholangiolymphatic reflux**)^Q

- Fever is the **most consistent sign**, generally **intermittent**, **spiking** and associated with **shaking chills**^Q.

Diagnosis

- Leukocytosis**, **hyperbilirubinemia**, and **raised ALP and transaminases**^Q
- Positive blood culture** is **more common** in **partial obstruction**^Q than with complete obstruction

- Cholangiography** (If **ERCP** is not available, **PTC** should be performed) is **mandatory** as a **diagnostic** and **potentially therapeutic intervention**^Q.

Treatment

- Initial treatment**: **IV antibiotics** and **aggressive hydration**^Q
- Septic shock** with **toxic cholangitis**: **ICU monitoring** and **vasopressors** to support blood pressure.
- Most patients** will respond to **these measures** alone.
- Urgent biliary decompression** will be necessary in 15% cases^Q.

- Biliary decompression may be performed endoscopically or by a percutaneous transhepatic route based on the level of the obstruction.

Methods of Biliary Decompression

ERCP with Sphincterotomy and Stone Extraction	Percutaneous Transhepatic Cholangiography (PTC)	Surgical Decompression
<ul style="list-style-type: none"> Procedure of choice^Q Early endoscopy is diagnostic and therapeutic^Q Permits biliary decompression by sphincterotomy and stone extraction^Q If stone can't be removed, a nasobiliary catheter or stent is inserted to decompress biliary tract^Q 	PTC is performed if: <ul style="list-style-type: none"> ERCP has failed or not available^Q Proximal or hilar obstruction^Q Stricture of biliary enteric anastomosis^Q 	<ul style="list-style-type: none"> Surgical decompression is indicated when neither ERCP nor PTC is possible^Q. Consists of CBD decompression with a T-tube^Q

Elective Definitive Treatment in Stabilized Patients

- Cholecystectomy** with **choledochotomy** and **CBD exploration**^Q
- T-tube** is left in place for **cholangiography** and **removal** of any **retained stone**^Q
- T-tube cholangiogram** is done on **7th-10th day** post-operatively^Q
- Remove** the T-tube if **cholangiogram** is **normal**^Q
- If **residual stone** is discovered on the post-operative **cholangiogram**, **T-tube** should be **left in place** for **4-6 weeks** for the **tract to mature**^Q.
- The **stones** are **removed percutaneously** through the **matured tract** by **Burhenne's technique**^Q.

22. Ans. b. 15% (Ref: Sabiston 19/e p1488-1491; Schwartz 9/e p1148, 10/e p1321-1322; Bailey 26/e p1111, 25/e p1125-1126; Blumgart 5/e p535; Shackelford 7/e p1326)

CHOLEDOCHOLITHIASIS

- Found in 6–12% of patients with GB stones^Q
- Retained stones** discovered **within 2 years** of cholecystectomy^Q
- Recurrent stones** detected > 2 years following cholecystectomy^Q.

23. Ans. d. Retained stones are discovered after 2 years of cholecystectomy

24. Ans. c. Supraduodenal choledochotomy (Ref: Blumgart 5/e p537-539; Shackelford 7/e p1326-1331)

Most stones in the CBD can be removed by **supraduodenal choledochotomy** (especially when ERCP is contraindicated).

Contraindications of ERCP	
<ul style="list-style-type: none"> Stone >1.5 cm^Q Multiple Gallstones^Q Intrahepatic stones^Q 	<ul style="list-style-type: none"> Impacted stones^Q Bile duct stricture^Q

OPEN CBD EXPLORATION

- It should be performed **when a concomitant biliary drainage procedure is indicated**.
- Open CBD exploration is associated with low operative mortality (1%–2%) and operative morbidity (8%–16%).
- Stones impacted** in the **ampulla** may be **difficult for both endoscopic ductal clearance and CBD exploration**^Q.
- In these cases, **transduodenal sphincteroplasty** and **stone extraction** should be **performed**; alternatively, if this is not successful, a **choledochoduodenostomy** or a **Roux-en-Y choledochojejunostomy** should be performed^Q.

CHOLEDOCHODUODENOSTOMY

- Choledochoduodenostomy:** At least **1.2 cm diameter** of CBD is required for allowing creation of **stoma 2.5 cm**. A dilated duct, at least 1.2 cm and preferably >2 cm in diameter is *sin qua non* of choledochoduodenostomy.
- Absolute Contraindication:** Duct <1.2 cm in diameter^Q (others are duodenal ulcer and acute pancreatitis)

Indications of Choledochoduodenostomy	
<ul style="list-style-type: none"> Retained/recurrent calculi in CBD or hepatic duct^Q Cholangitis^Q Ampullary stenosis^Q Presence of primary choledochal calculi or bile stasis^Q 	<ul style="list-style-type: none"> Tubular stricture of transpancreatic portion of CBD due to chronic pancreatitis Combination of one or more indications Low iatrogenic strictures^Q Malignant obstruction^Q in periampullary area

25. Ans. b. Brown stone

26. Ans. b. Cutaneous hepaticojejunostomy

This is a case of recurrent pyogenic cholangitis. Cutaneous hepaticojejunostomy is preferred treatment modality.

TREATMENT OF RECURRENT PYOGENIC CHOLANGITIS

- Treated with a **multidisciplinary approach** (endoscopy, interventional radiology, and surgery)
- The long-term goal of therapy is to **extract stones, remove debris, and relieve strictures**.
- **Roux-en-Y hepaticojejunostomy** with a **subcutaneous afferent limb (Hudson loop^Q)** is a safe and effective way to provide access to the **biliary tree for stone extractions^Q**.

27. Ans. a. Endoscopic papillotomy, b. ERCP, e. Choledochotomy

28. Ans. a. Fever, abdominal pain, jaundice

- **Charcot's triad^Q**: Abdominal pain + jaundice + fever^Q
- **Reynold's pentad^Q**: Charcot's triad + altered mental status + shock (hypotension)^Q

29. Ans. d. 11'O clock position (Ref: Sabiston 19/e p1494; Schwartz 9/e p1148, 10/e p1327)

TRANSDUODENAL SPHINCTEROPLASTY

- This cut is made **superiorly** (at the **11 o'clock position**)^Q for 4 to 5 mm.
- The sphincter is incised at the **11–O'clock position** to avoid injury to the **pancreatic duct^Q**.

30. Ans. a. Increased bilirubin, b. ↑WBC count, c. ↑liver enzymes, d. Fever with rigors

31. Ans. b. CBD stone

32. Ans. a. Escherichia coli

33. Ans. a. Increased leucocyte count, b. Increased transaminases, c. Increased alkaline phosphatase, d. Association with fever and chills

34. Ans. d. Septic shock

35. Ans. a. ERCP and bile duct stone extraction (Ref: Sabiston 19/e p1483–1484; Schwartz 9/e p1141; Bailey 26/e p1101–1102, 25/e p1115–1116; Blumgart 5/e p331–344; Shackelford 7/e p1326–1329)

ERCP

- Endoscopic clearance of CBD stones can **avoid the need for an open operation^Q** if expertise in laparoscopic common bile duct exploration is not available.

Indications of preoperative ERCP	
<ul style="list-style-type: none"> • Patients with worsening cholangitis^Q • Ampullary stone impaction^Q • Biliary pancreatitis^Q 	<ul style="list-style-type: none"> • Impacted stones^Q • Cirrhosis^Q

- If clearance is not possible because of multiple stones, intrahepatic stones, impacted stones, difficulty with cannulation, duodenal diverticula, or biliary stricture, this information is known before surgery.
- **Endoscopic sphincterotomy with stone extraction** is **well tolerated** in most patients, with a **5–8% complication rate^Q**.
- **Complete clearance** is achieved in **71–75% of patients at the first procedure** and in **84–95% of patients after multiple endoscopic procedures^Q**.
- **Prompt cholecystectomy** after endoscopic clearance of the CBD should be performed during the hospital admission if the **patient is fit for surgery^Q**.
- Patients **> 70 years** should have their **ductal stones cleared endoscopically** as their **sole therapy**; only about **15% become symptomatic** from their Gallstones in their remaining lifetime, which can then be treated as symptoms arise^Q.

Contraindications of Endoscopic sphincterotomy
<ul style="list-style-type: none"> • CBD diameter >2 cm^Q • Long suprasphincteric stricture, >15 mm^Q • Peri-vaterian diverticulum^Q • Duodenal wall and head of the pancreas severely inflamed^Q

36. Ans. b. ERCP

37. Ans. d. Sphincterotomy and then cholecystectomy

Cholecystectomy with choledocholithotomy at same setting **should not be done**, as **diameter** of CBD is **<1 cm**.

38. Ans. a. Endoscopic sphincterotomy

39. Ans. c. Endoscopic stone extraction

- ## CHOLEDOCHOLITHIASIS: TREATMENT OPTIONS

- ## COURVOISIER'S LAW

- ### Exceptions to Courvoisier's Law

- ## LEUCINE AMINOPEPTIDASE

- **Increased Leucine aminopeptidase (LAP) activity** is seen in:
 - Carcinoma of the pancreas, choledocholithiasis, acute pancreatitis^Q
 - Viral hepatitis, cirrhosis, carcinoma with liver metastases^Q
- In **common bile duct obstruction**, whether due to **carcinoma pancreas** or **choledocholithiasis**, the **elevated serum LAP levels returned to normal following relief of the obstruction**. This is in agreement with the hypothesis that the increased serum LAP activity in these conditions is the result of bile duct obstruction.

56. Ans. b. Distended and palpable gallbladder
 57. Ans. a. Observation, c. Medical dissolution of stone (Ref: Bailey 26/e p1111, 25/e p1126; CSDT 11th /1163)

- Medical dissolution is used for Gallstones, not the CBD stones.
- CBD stones are rarely asymptomatic, often present with complications. CBD stones should be treated, if diagnosed. Treatment options are ERCP, laparoscopic or open CBD exploration.

CHOLEDOCHOTOMY AND CBD EXPLORATION

58. Ans. d. Convert to open cholecystectomy and CBD stone removal (Ref: Shackelford 7/e p1326-1331)

Management of CBD Stones Associated with GB Stones	
Pre-operatively Detected Stones	Unsuspected stones found at the time of Cholecystectomy
Experienced Laparoscopic Surgeon	Experienced Laparoscopic Surgeon
<ul style="list-style-type: none"> • Cholecystectomy and choledochotomy in same sitting^Q 	<ul style="list-style-type: none"> • Laparoscopic CBD exploration and stone retrieval through the cystic duct^Q • Laparoscopic choledochotomy and stone extraction^Q
Inexperienced Laparoscopic Surgeon	Inexperienced Laparoscopic Surgeon
<ul style="list-style-type: none"> • Pre-op ERCP with stone removal and laparoscopic cholecystectomy later^Q. 	<ul style="list-style-type: none"> • Convert to open procedure and remove CBD stone^Q • Complete the cholecystectomy and refer the patient for ERCP^Q • Conversion to an open procedure is preferred over ERCP^Q, because the success rate of ERCP is not 100%^Q.

59. Ans. d. Abnormal gamma glutamyl transferase
 60. Ans. a. Synthetic absorbable (Ref: Shackelford 7/e p2222-2224)

- Synthetic absorbable suture such as Vicryl is preferred for CBD^Q.
- Vicryl sutures are used in general soft tissue approximation and vessel ligation^Q.
- Non absorbable sutures ordinarily remain where they are buried within the tissues. This can cause late complications such as the development of Gallstones around non-absorbable sutures in the common bile duct or bladder stones in the urinary bladder. In these situations it is best to use absorbable materials^Q.

61. Ans. c. 12th postoperative day
 62. Ans. b. 5–9 days
 63. Ans. a. Supraduodenal choledochotomy
 64. Ans. c. Endoscopic sphincterotomy and stone extraction
 65. Ans. a. Retained stone (Ref: Sabiston 19/e p1489, 18th/1561)

Most common complication of common bile duct exploration retained stone.

- Clearance of all common bile duct stones is achieved in 75–95% of patients with laparoscopic CBD exploration^Q.
- The rate of retained CBD stone is <5%.
- MC complication of laparoscopic CBD exploration^Q is retained stone.

LAPAROSCOPIC CBD EXPLORATION (LCBDE)

- An intraoperative cholangiogram at the time of cholecystectomy will also document the presence of CBD stones^Q.
- LCBDE through the cystic duct or with formal choledochotomy allows the stones to be retrieved during the same procedure.
- If the expertise and instrumentation for laparoscopic CBD exploration are not available, a drain should be placed and left adjacent next to the cystic duct and an endoscopic cholangiogram performed the following day.
- An open CBD exploration should be performed if endoscopic intervention is not available or not feasible because of anatomic restrictions or expertise.
- If a choledochotomy is performed, a T tube is left in place.
- The purpose of the T tube is to provide access to the biliary system for postoperative radiologic stone extraction^Q and allow spasm or edema of sphincter to settle.
- The size of the tube is therefore of importance, in that tubes <16 French do not allow for postoperative radiologic instrumentation without dilation of the tract; a minimum of 4 to 6 weeks should pass for the tract to mature^Q before instrumentation.

66. Ans. b. Choledocholithiasis
 67. Ans. a. Smaller stone in CHD

BILE DUCT INJURY AND BILIARY STRICTURES

68. Ans. a. Incidence is equal in laparoscopic and open cholecystectomy (Ref: Sabiston 19/e p1494-1498; Schwartz 9/e p1158-1160; Bailey 26/e p1112, 25/e p1125-1127; Blumgart 5/e p615-644; Shackelford 7/e p1380-1388)

BILE DUCT INJURY AND LIGATION

- Most benign strictures follow iatrogenic bile duct injury^Q
- Most commonly during laparoscopic cholecystectomy^Q
- Incidence of bile duct injury during open cholecystectomy is 0.1–0.2%^Q
- Incidence of bile duct injury during laparoscopic cholecystectomy is 0.3–0.85%^Q

Pathogenesis**Risk Factors for Bile Duct Injury**

- | | |
|--|--|
| <ul style="list-style-type: none"> • Acute or chronic inflammation^Q • Obesity^Q | <ul style="list-style-type: none"> • Anatomic variation^Q • Bleeding^Q |
|--|--|

- Bile duct injury rate increased in acute cholecystitis, pancreatitis, cholangitis, and obstructive jaundice^Q.

- As surgeon experience increases beyond 20 cases, the bile duct injury rate decreases^Q.
- Errors leading to laparoscopic bile duct injuries stem from 'misperception'^Q, not errors of skill, knowledge or judgment.
- The primary cause of error in 97% cases was a 'visual perceptual illusion'^Q, whereas only 3% injuries were due to faults of technical skills^Q.

- Surgical technique with inadequate exposure and failure to identify structures before ligating or dividing them are the most common cause of significant biliary injury^Q.
- The routine use of intra-operative cholangiography may limit the extent of bile duct injury, but does not seem to prevent it^Q.
- If a bile duct injury is suspected during cholecystectomy, a cholangiogram must be obtained to identify the anatomy^Q.
- Classic Laparoscopic Injury: A long length of the common duct is excised up to the proximal common hepatic duct, which is either occluded or left to drain bile into the peritoneal cavity.

Clinical Features

- About 25% of major ductal injuries are recognized intraoperatively^Q because of bile leakage, an abnormal cholangiogram, or late recognition of the anatomy.
- MC presentation of a complete occlusion of the common hepatic or bile duct is jaundice with or without abdominal pain^Q.
- Patients may also present months or years after prior surgery with cholangitis or cirrhosis secondary to a biliary tract injury.

Diagnosis

- USG or CT should be performed in patients with signs of abdominal pain or peritonitis, sepsis, or any other clinical suspicion of biloma^Q.
- Patients must be stabilized with immediate parenteral antibiotics and image-guided percutaneous drainage of any fluid collections^Q.
- Cholangiography should be performed to establish the presence of ductal stricture, identify the level of the stricture, and identify the nature of the injury when necessary^Q.
- PTC is the imaging method of choice for most postoperative biliary strictures^Q

- ERCP may be easier to obtain in a patient with a biliary stricture and cholangitis who requires urgent cholangiography and biliary decompression.
- However, this is only useful in patients with bile duct continuity.
- Cystic duct leaks or small tangential injuries can be treated with endoscopic stenting.
- In situations in which the biliary stricture is too tight to pass with ERCP, PTC may be performed for proximal biliary decompression.

- CT arteriography should be considered in the preoperative evaluation of patients with benign biliary strictures.
- Unrecognized injury to the hepatic artery or a portal vein branch occurs with a frequency of 12–47% concomitant with a bile duct injury.
- In patients presenting with late strictures with evidence of liver dysfunction, a CT arteriogram should be performed to evaluate for evidence of portal hypertension.

69. Ans. d. Most common reason for bile duct injury is lack of techniques and errors of judgment (Ref: Sabiston 19/e p1495)

- As surgeon experience increases beyond 20 cases, the bile duct injury rate decreases^Q.
- Errors leading to laparoscopic bile duct injuries stem from 'misperception'^Q, not errors of skill, knowledge or judgment.
- The primary cause of error in 97% cases was a 'visual perceptual illusion'^Q, whereas only 3% injuries were due to faults of technical skills^Q.

70. Ans. a. Upper (Ref: Sabiston 19/e p1494-1496)

- Most common duct injuries occur during attempted dissection of the cystic duct when the CBD is mistaken for cystic duct^Q.
- These injuries involve transection of the upper part of the CBD^Q and excision of a variable portion of the CBD proximal to first transection, including cystic duct-common duct junction.

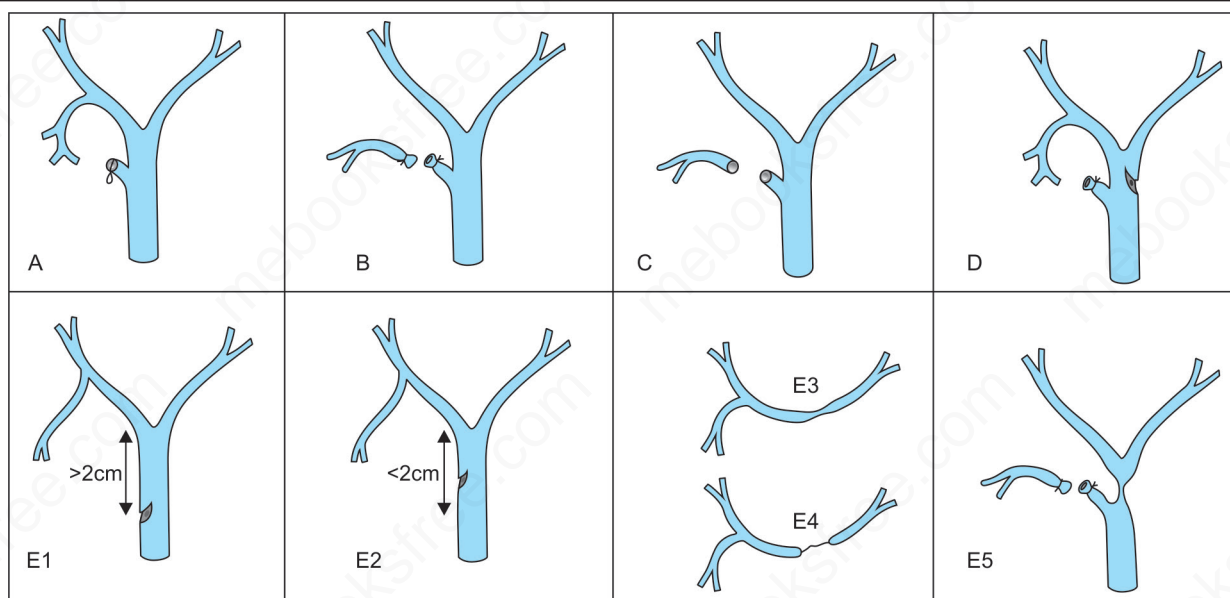
THE STEWART-WAY CLASSIFICATION OF LAPAROSCOPIC BILE DUCT INJURY

- The **Stewart-Way classification** is based primarily on the **anatomic pattern** and **mechanism** of a particular injury and the presence of associated **vascular injury**.

The Stewart-Way classification of laparoscopic bile duct injury	
Class	Criteria
I.	CBD mistaken for cystic duct but recognized ; cholangiogram incision of cystic duct extended into CBD
II.	Lateral damage to common hepatic duct from cautery or clips placed on duct; associated bleeding, poor visibility
III.	CBD mistaken for cystic duct, not recognized ; CBD, CHD, RHD, LHD transected or resected
IV.	RHD mistaken for cystic duct, RHA mistaken for cystic artery , RHD and RHA transected; lateral damage to the RHD from cautery or clips placed on ducts

71. Ans. c. Type D (Ref: *Sabiston 19/e p1495; Shackelford 7/e p1381-1382*)

Bismuth Classification of Bile Duct Strictures	
Type 1	Low common hepatic duct stricture ; hepatic duct stump $>2\text{cm}^Q$
Type 2	Mid common hepatic duct stump $<2\text{cm}^Q$
Type 3	High stricture (hilar) , no hepatic duct stump; confluence intact ^Q
Type 4	Destruction of the hilar confluence ; right and left hepatic ducts separated ^Q
Type 5	Involvement of aberrant right sectoral hepatic duct alone with or without a concomitant hepatic duct stricture ^Q



Strasberg classification of postoperative bile duct strictures

- The **shortcomings** in **Bismuth's classification** were that firstly it did not stipulate the **length** of the stricture, and secondly, and more importantly it did not take into account the presence of **biliary leaks**, which are more common after laparoscopic cholecystectomy.
- This, **latter fact** has been incorporated in **Strasberg's classification**; also patients with limited strictures, isolated right hepatic duct strictures or cystic duct leaks cannot be classified.

Strasberg Classification of Laparoscopic Biliary Injuries	
Type A	<ul style="list-style-type: none"> Bile leaks from minor ducts still in continuity with the CBD^Q Includes leakage from cystic duct stump and from a subvesical duct of Luschka^Q MC causes of biliary leaks seen after laparoscopic cholecystectomy^Q

Strasberg Classification of Laparoscopic Biliary Injuries	
Type B	• Occlusion of a part of the biliary tree, almost always an aberrant right sectoral duct ^Q
Type C	• Transection without ligation of an aberrant right sectoral duct ^Q
Type D	• A lateral injury to an extrahepatic duct ^Q
Type E	• Includes biliary strictures, divided into E1 to E5 as classified by Bismuth

OTHER CLASSIFICATION SYSTEM FOR BILE DUCT INJURIES

- Amsterdam Academic Medical Center's classification
- Neuhaus' classification
- Csendes' classification
- Stewart-Way's classification of laparoscopic bile duct injuries
- Chinese University of Hong Kong (CUHK) classification

72. Ans. c. Type C

73. Ans. b. Type B

74. Ans. b. Occlusion of a branch of biliary tree

75. Ans. c. Sectoral duct injury with consequent leak

76. Ans. a. CBD stone, b. Cholangiocarcinoma, c. Chronic pancreatitis, d. Trauma (Ref: Sabiston 19/e p1503)

Causes of Biliary Strictures		
Benign		Malignant
<ul style="list-style-type: none"> • Congenital: <ul style="list-style-type: none"> – Biliary atresia^Q • Operative injury: <ul style="list-style-type: none"> – Cholecystectomy^Q – Choledochotomy^Q – Gastrectomy – Hepatic resection – Transplantation 	<ul style="list-style-type: none"> • Inflammatory: <ul style="list-style-type: none"> – Stones^Q – Cholangitis – Parasitic – Pancreatitis^Q – Sclerosing cholangitis^Q – Radiotherapy • Trauma • Idiopathic 	<ul style="list-style-type: none"> • Cholangiocarcinoma^Q • CA head of pancreas • Ampullary carcinoma • Metastasis to liver or biliary tract

- MC cause of benign biliary stricture is laparoscopic cholecystectomy.

77. Ans. a. Type A

78. Ans. d. Clinical observation (Ref: Sabiston 19/e p1496; Schwartz 9/e p1159; Bailey 26/e p1111, 25/e p1125-1127; Shackelford 7/e p1385)

- "A small amount of biliary drainage following cholecystectomy should cause no alarm because it usually disappears within 1 or 2 days^Q. However, excessive biliary drainage through the wound or drain site, jaundice, sepsis or a combination of these events early in the post-operative period should suggest a bile duct injury, as should copious biliary drainage for more than few post-op days^Q."

79. Ans. b. Percutaneous drainage (Ref: Sabiston 19/e p1496-1498; Schwartz 9/e p1159; Bailey 26/e p1111, 25/e p1125-1127; Blumgart 5/e p630-631; Shackelford 7/e p1385-1388)

MANAGEMENT OF THE BILE DUCT INJURY RECOGNIZED AFTER CHOLECYSTECTOMY

- Patients with a bile leak will present early^Q
- Patients with postoperative biliary strictures alone often present with jaundice or cholangitis months to years after the initial injury^Q.

Intraoperative Considerations

- The management of postoperative biliary strictures following ductal injury depends on the degree of injury, the presence of stricture-induced complications, and the operative risk of the patient.

Planning of the following specific goals
<ul style="list-style-type: none"> • Control the infection (abscess or cholangitis)^Q • Drain the biloma^Q • Complete the cholangiography^Q • Provide definitive therapy with controlled reconstruction or stenting^Q

- **Independent predictors of stricture recurrence after an initial operative repair:**
 - Cholangitis before the initial repair
 - Incomplete cholangiography
 - Primary repair within 3 weeks of the bile duct injury
- If **immediate repair** is to be attempted, consultation with **more experienced surgeons** should be made.
- In those cases in which **expertise is not available** at the time of a recognized injury, or **difficult circumstances** preclude elaborate reconstructive attempts, **external biliary drains** will allow patient recovery and **transfer to a center of excellence**^Q.

Successful repair of biliary strictures requires adherence to specific surgical principles

- Use of **proximal bile duct** with **minimal inflammation**^Q
- Creation of a **tension-free anastomosis** with the use of a **Roux-en-Y jejunal limb**^Q
- Direct **mucosa-to-mucosa anastomosis**^Q

- **Direct operative biliary-enteric bypass** is the **gold standard procedure**^Q for the long-term treatment of biliary strictures. These procedures have low operative mortality and acceptable morbidity.
- The **Hepp-Couinaud approach to bile duct reconstruction** is the **best option**^Q in most circumstances. This technique requires dissection of the hilar plate to expose the left hepatic duct and allow for a side-to-side anastomosis of the left hepatic duct to the Roux-en-Y jejunal limb.

Interventional Radiologic and Endoscopic Techniques

- These techniques allow:
 - **Percutaneous drainage** of abdominal fluid collections
 - **Preoperative identification** of the **ductal anatomy** through PTC
 - **Stricture dilation** with or without placement of **palliative stents** for bile drainage in the patient whose overall physiologic status precludes a major operation.
- **Percutaneous transhepatic dilation** can be employed in patients with intrahepatic ductal disease and in patients in whom **ERCP is not possible**.

- Success rate of **percutaneous transhepatic dilation** is **50–70%**^Q.
- Patients with **anastomotic strictures** (including **biliary-enteric anastomotic strictures**) have the **highest success rates**^Q.
- Treatment of biliary strictures with **interventional radiologic methods**, requires **multiple sessions of dilations**, and **nonischemic strictures** (anastomotic strictures) **respond best**^Q.

- **Endoscopic stenting and drainage** is a **successful treatment option** for **cystic duct leak** or **small common bile duct leaks** following laparoscopic cholecystectomy.
- **Ischemic biliary strictures** will **not respond permanently to dilation**. **Early retreatment** (through **repeat dilation** or **biliary-enteric reconstruction**) of postdilation recurrent strictures is **essential** to prevent secondary biliary cirrhosis^Q.

80. Ans. b. Percutaneous drainage of fluid (Ref: Sabiston 19/e p1496; Schwartz 9/e p1159-1160; Bailey 26/e p1111, 25/e p1125-1127; Blumgart 5/e p628-629; Shackelford 7/e p1385)

GOALS OF THERAPY IN IATROGENIC BILE DUCT INJURY

- **Control of infection limiting inflammation:**
 - Parenteral antibiotics^Q
 - **Percutaneous drainage of periportal fluid collection**^Q
- **Clear and thorough delineation of entire biliary anatomy:**
 - MRCP/PTC^Q
 - ERCP (especially if cystic duct stump leak suspected)^Q
- **Re-establishment of biliary enteric continuity:**
 - Tension-free, mucosa-to-mucosa anastomosis^Q
 - Roux-en-Y hepaticojejunostomy^Q
 - Long-term transanastomotic stents if involving bifurcation or higher^Q

81. Ans. a. Ultrasound guided aspiration (Ref: Blumgart 5/e p627)

- Many bile leaks resolve with percutaneous drainage alone, and ERCP is probably unnecessary in the absence of radiographic or clinical evidence of ongoing bile drainage.

82. Ans. c. Computed tomography (Ref: Blumgart 5/e p627)

CT is probably the best initial study, the results of which help direct further investigations.

RADIOLOGICAL INVESTIGATIONS IN POST-CHOLECYSTECTOMY BILE DUCT INJURY**Duplex ultrasonography**

- Excellent, noninvasive means of **showing intrahepatic ductal dilation** and may reveal a **subhepatic fluid collection** or evidence of **vascular damage**.
- May provide **valuable information** regarding the **level of biliary injury**, it is of **little value** in assessing the extent of a stricture and is of **no value** if the **biliary tree is decompressed**.

Computed tomography

- CT is **probably the best initial study**^Q, the results of which **help direct further investigations**.
- A **good quality CT scan** shows a **dilated biliary tree** and helps **localize the level of ductal obstruction** in patients with strictures.
- CT **identifies fluid collections** or ascites, which may suggest the **possibility of vascular damage**, and it **reveals lobar atrophy**^Q.

Percutaneous transhepatic cholangiography

- PTC is much more likely than ERCP to provide this information, and PTC remains the **standard investigation in this setting**^Q.

Magnetic resonance cholangiopancreatography

- MRCP has emerged as a valuable tool in **evaluating proximal bile duct injuries**
- This noninvasive modality provides striking images of the biliary tree and yields anatomic information in a single study that was previously obtainable only with CT and PTC

ERCP

- ERCP is **seldom of value** in the **precise diagnosis** of **complete proximal bile duct strictures** because there is **often discontinuity** of the CBD preventing visualization of the intrahepatic ductal system^Q.
- ERCP may be **more helpful for incomplete strictures (stenoses)**^Q
- ERCP also has a **role in the diagnosis and treatment** of patients with **bile leakage from the cystic duct stump** or from a **laceration of the common duct**^Q

Isotopic scanning techniques

- HIDA scanning offers a **dynamic and quantitative assessment of liver function** and of the **clearance of bile across anastomosis and stenosis**.
- In patients with **hepatocellular disease**, HIDA scanning may be valuable in **distinguishing** the contribution of the **biliary obstruction** from that of the **intrinsic liver disease** to the overall biochemical of isotope from a portion of the liver.

Arteriography and delayed-phase portography

- Can be obtained to **confirm vascular injury** on the initial studies, a **suspicion of portal hypertension** from the history and physical examination, or a **history of excessive bleeding** at the **time of cholecystectomy**.

83. Ans. d. Routine use of 'open' technique of laparoscopic port insertion has resulted in a decline in the incidence of post laparoscopic cholecystectomy bile duct injuries (Ref: Sabiston 19/e p1491-1492; Bailey 26/e p1109-1110, 25/e p1123)

- Pneumoperitoneum is created by use of **Hasson's canula** in **open technique** of laparoscopic port insertion.
- **Open technique** has resulted in **reduction of trocar induced vascular and bowel injuries**, not the incidence of post laparoscopic cholecystectomy bile duct injuries.
- **Open cholecystectomy** is associated with **reduced incidence** of post laparoscopic cholecystectomy bile duct injuries as compared to laparoscopic cholecystectomy.

84. Ans. d. Laparoscopic cholecystectomy operation

85. Ans. b. Trauma

- MC cause of benign biliary stricture is laparoscopic cholecystectomy (operative trauma)^Q.

BILIARY FISTULA

86. Ans. c. Gallstones (Ref: Blumgart 5/e p645-669; Shackelford 7/e p1385)

BILIARY FISTULA

- **Internal fistulas** are spontaneous, rare, and occur without a significant collection of bile.
- **External fistulas** are more common and are often caused by iatrogenic injury after operations, invasive procedures, or trauma involving the biliary tract.

EXTERNAL BILIARY FISTULA

- **External fistulas** are more common and are often caused by iatrogenic injury after operations, invasive procedures, or trauma involving the biliary tract.

Etiology

- Bile leakage from the **cystic duct remnant**^Q
- Difficult cases of **open cholecystectomy**^Q
- **Central hepatectomy** and **caudate resection**^Q
- Hepatic **cryotherapy** or **harmonic scalpel** use^Q

Treatment

- Patients with **leaks from the cystic duct**, duct of **Luschka**, and **T-tube tract** are optimal candidates for **endoscopic treatment**^Q.
- Patients treated with **stents alone** experience equally good outcomes as patients treated with a combination of **stents** and **sphincterotomy**^Q

87. Ans. a. Gastric ulcer (Ref: Blumgart 5/e p644-657)

INTERNAL BILIARY FISTULA

- **Internal fistulas** are spontaneous, rare, and occur without a significant collection of bile.
- **Cholecystoduodenal** fistulas (72–80%) are **MC** biliary-enteric fistulas followed by **cholecystocolic** fistulas (8–12%)^Q
- Most **cholecystoduodenal fistula** are **asymptomatic**^Q.
- The site of fistula most commonly located in the **vaterian segment** of the **CBD** in case of the **choledochoduodenal fistula**^Q.

Etiology

- **Calculous biliary tract disease** (90%)^Q
- **Duodenal ulcer** (6%)
- **Neoplasm**, **trauma**, **parasitic infestation**, and **congenital anomalies** (4%)

Diagnosis

- Only **one-third** of biliary-enteric fistulas will present with **air** in the **biliary tree**^Q.
- A **negative upper gastrointestinal series** in the presence of **pneumobilia** is an indication for a **barium enema**, which discloses greater than 95% of **cholecystocolic fistulae**^Q.

Management

- In the **absence of obstruction**, **residual stones**, or **symptoms**, except for **cholecystogastric** and **cholecystocolic** fistulas, **no operation** should be performed because most fistulas **close spontaneously**^Q.
- For **cholecystocolic fistula**, **choledochotomy** is recommended as a **first step**, followed by **cholecystectomy**, and **finally takedown and repair** of the **fistula** to reduce bacterial contamination^Q.
- In other cases, the usual approach is repair of the fistula, then cholecystectomy and closure of the bowel.

SPHINCTER OF ODDI DYSKINESIA

88. Ans. a. Transduodenal sphincteroplasty (Ref: Sabiston 19/e p1491; Shackelford 7/e p1333-1336)

SPHINCTER OF ODDI DYSFUNCTION

- Pain similar to **biliary colic** with **normal LFT** and episodes of **acute pancreatitis** have been attributed to a poorly defined syndrome known as **Sphincter of Oddi dysfunction**^Q.
- The **pathogenesis** is **unclear**
- Postulated theories include **gallstone migration** inducing **fibrosis** of the sphincter, **trauma**, **pancreatitis**, and **congenital anomalies**.
- **Modified Milwaukee classification** is used for **Biliary Sphincter of Oddi dysfunction**^Q

Types

- **Sphincter of Oddi Stenosis:**
 - Also known as **papillitis**^Q
 - **Benign intrinsic obstruction** of the **CBD outlet**^Q
- **Sphincter of Oddi Dyskinesia:**
 - It is an **intermittent functional blockage** of the high-pressure zone of the sphincter^Q
 - **Basal pressure** is **elevated**, but administration of smooth muscle relaxants (**nitrates**) causes **decrease of the basal sphincter pressure** in functional dyskinesia^Q

Clinical Features

- Pain similar to **biliary colic** with **normal LFT** and episodes of **acute pancreatitis**^Q

Diagnosis

- A **dilated CBD** (>12 mm diameter) or **increase in CBD diameter in response to CCK** is a **typical ultrasound finding**^Q.
- **Endoscopic manometry** is considered **gold standard** ^Q for diagnosis

- **Nardi Test^Q**: The most widely used **pharmacologic test** to assess sphincter function is the **morphine-prostigmine provocation test^Q**
- **Treatment**
- Treatment of choice: **Transduodenal sphincteroplasty with transampullary septectomy^Q**

BILIARY TRACT DISEASES

89. Ans. b. Sarcoidosis (Ref: Harrison 18th/329)

VANISHING BILE DUCT SYNDROME

- Rare condition characterized by **decreased number of bile ducts** seen in liver biopsy specimens^Q

Causes of Vanishing Bile Duct Syndrome	
<ul style="list-style-type: none"> • Chronic rejection^Q after liver transplantation • Graft-versus-host disease^Q after BM transplantation 	<ul style="list-style-type: none"> • Sarcoidosis^Q • Drugs: Chlorpromazine^Q • Idiopathic^Q

90. Ans. a. GVHD

BILIARY ATRESIA

91. Ans. c. Marked bile duct degeneration, d. Fibrosis of hepatic duct, e. Parenchymal cholestasis (Ref: Sabiston 19/e p1852-1853; Schwartz 9/e p1438-1440, 10/e p1628-1630; Bailey 26/e p1104-1105, 25/e p1118-1119; Blumgart 5/e p595-603; Shackelford 7/e p1390-1396)

BILIARY ATRESIA

- Characterized by **progressive obliteration** of the **extrahepatic** and **intrahepatic** bile ducts^Q.
- **Etiology is unknown**; incidence **1 in 12,000** live births^Q.
- Presently, there is **no medical therapy** to **reverse the obliterative process^Q**

- Patients who are **not offered surgical treatment** uniformly develop biliary cirrhosis, portal hypertension, and death by **2 years of age^Q**.

- **MC indication for pediatric liver transplantation^Q**

Pathology

- **Bile duct proliferation**, **severe cholestasis** with **plugging**, and **inflammatory cell infiltrate** are the **pathologic hallmarks** of this disease^Q.
- Over time, these changes **progress to fibrosis** with **end-stage cirrhosis^Q**.
- Positive for neural cell adhesion molecule (CD56) staining

Variants of biliary atresia

- Patency to the level of CBD
- Patency to the level of common hepatic duct
- Left and right hepatic duct at porta involved, **solid porta hepatis (90%)**

Clinical Features

- Infants with biliary atresia present with **jaundice at birth** or **shortly thereafter^Q**.
- Infants with biliary atresia characteristically have **acholic, pale gray stools**, secondary to obstructed bile flow.
- With passage of time, **progressive failure to thrive** and, if untreated, develop **stigmata of liver failure** and **portal hypertension** (splenomegaly and esophageal varices)
- **Associated malformations** in 25%: **Polysplenia**, **malrotation**, **preduodenal portal vein**, and **intrahepatic vena cava^Q**.

Diagnosis

- **USG of the liver and GB** is important in the evaluation of the infant with cholestasis.

- **USG: GB is shrunken** and **CBD is not visible^Q**. A **triangle cord sign^Q** found on ultrasound has a **predictive accuracy of 95%**, the **gallbladder ghost triad^Q** in which the **gallbladder is short** (<1.9 cm) and **irregular** and **lacks an echogenic inner lining** also got good sensitivity.

- **Next diagnostic step: Percutaneous liver biopsy^Q** if the hepatic synthetic function is normal (diagnostic accuracy 90%).
- **Hepatobiliary scintigraphy**: In cases in which the **USG and biopsy findings are inconclusive** (**absent excretion into the intestine^Q**)

Treatment

- **Exploratory laparotomy:** If the needle biopsy or abdominal ultrasound is consistent with BA
- **Intra-operative cholecystocholangiography:** To confirm the **diagnosis**, demonstration of the **fibrotic biliary remnant** and definition of **absent proximal and distal bile duct patency**^Q

• Treatment of choice: **Kasai hepatoportoenterostomy**^Q (Roux-en-Y hepaticojejunostomy)

Postoperative Management

- **Ursodeoxycholic acid** (facilitate bile flow) + **Methylprednisolone** (anti-inflammatory agent) + **TMP-SMX** (antimicrobial prophylaxis)^Q

• **Cholangitis** is the **MC** post-operative **complication**^Q.

Prognosis

- About **30%** of infants undergoing hepatoportoenterostomy **before 60 days** of age will have a **long-term successful outcome** and **not require liver transplantation**^Q.
- **Liver transplantation** in the patients who develop **progressive hepatic fibrosis** with resultant **portal hypertension** and progressive cholestasis^Q.
- **Serum bilirubin** at **3 months** after surgery seems to be **strongly predictive of long-term survival**^Q.

92. Ans. d. Liver biopsy (Ref: Sabiston 19/e p; Schwartz 9/e p1439, 10/e p1628-1630; Bailey 25/e p1118-1119; Blumgart 5/e p598; Shackelford 7/e p1392)

BILIARY ATRESIA

- Evaluation of biliary anatomy begins with ultrasound.
- Other imaging modalities such as HIDA scintigraphy, MRCP and ERCP have been used with varying success.
- Although there are useful adjuncts, **liver biopsy is gold-standard for the diagnosis of biliary atresia** and can safely be done percutaneously under local anesthesia.

93. Ans. e. Age of 8 weeks (Ref: Blumgart 5/e p600; Shackelford 7/e p1394)

Major factors in successful outcome after Portoentereostomy

- | | |
|---|---|
| <ul style="list-style-type: none"> • Age in days at diagnosis and initial surgery (30–60 days)^Q • Length of time jaundice was present before surgery^Q • Successful and persistent bile flow postoperatively^Q • Size and nature of the microscopic ducts (>150 µm)^Q | <ul style="list-style-type: none"> • Degree and extent of fibrotic changes in the liver^Q • Need for phototherapy as a neonate^Q • Technical aspects of the portoenterostomy and anastomosis^Q • Presence of bile in hepatic lobular zone 1 |
|---|---|

94. Ans. c. Biliary atresia

PRIMARY SCLEROSING CHOLANGITIS

95. Ans. b. ITP (Ref: Sabiston 19/e p1502-1503; Schwartz 9/e p1156, 10/e p1331; Bailey 26/e p1112-1113, 25/e p1127; Blumgart 5/e p603-615; Shackelford 7/e p1405-1414)

Diseases Associated with PSC

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • Chronic ulcerative colitis^Q • Crohn's disease^Q • Autoimmune hepatitis • Chronic pancreatitis | <ul style="list-style-type: none"> • Hypereosinophilia • Riedel's thyroiditis^Q • Celiac disease • Autoimmune hemolytic anemia • Sicca syndrome | <ul style="list-style-type: none"> • Sarcoidosis^Q • Glomerulonephritis • Retroperitoneal fibrosis^Q • Systemic sclerosis |
|---|--|---|

PRIMARY SCLEROSING CHOLANGITIS

- PSC is a **cholestatic liver disease** characterized by **fibrotic strictures** involving the **intrahepatic and extrahepatic biliary tree**^Q in the absence of a known precipitating cause.
- More common in HLA **B8/DR3**^Q

• The **incidence** of UC in PSC ranges from **75–80%**^Q.

• PSC is **present** in **5.5%** of patients with **chronic UC**^Q.

- Patients with PSC are at **increased risk** for developing **cholangiocarcinoma**^Q.
- **Smoking** is **protective** in UC and PSC^Q. (AD, PD)

Pathology

- **Cholangiocytes**^Q, epithelial cells that lines the bile duct are **target cell** of injury in **PSC**.
- Histologic finding of “**onion skin appearance**”^Q is **pathognomonic** of **PSC**, but seen in <10% cases.

- Involvement of **large intrahepatic** and **extrahepatic duct**^Q distinguishes **PSC** from **PBC**.
- **Absence of the smallest intrahepatic ducts** leading to a **reduction in the branching** of the biliary tree (give rise to **pruned-tree appearance**^Q on direct cholangiography).

- Histologic changes in the same liver can be **markedly varied** from **segment to segment**^Q at any given time.

Clinical Features

- More common in **males**^Q, mean age at presentation is **40–45 years**^Q
- About **75% of patients** are **symptomatic**^Q at presentation with evidence of cholestatic liver disease such as **jaundice**, **pruritus**, and **fatigue**^Q.
- Symptoms of bacterial cholangitis are uncommon.
- The condition is characterized by **relapses** and **remissions**^Q, with quiescent periods.
- The median survival from the time of diagnosis ranges from 10 to 12 years.

Diagnosis

- **Asymptomatic elevation** of **GGT** is the **earliest finding**^Q, **ALP** and **bile acids** are also increased.
- **Normal ALP does not always rule out** diagnosis of **PSC**^Q.
- **Cholangiography** confirms the **diagnosis of PSC** with evidence of **diffuse multifocal strictures** found in both **intrahepatic** and **extrahepatic bile ducts**^Q.

ERCP Findings in PSC

- **ERCP** is the **gold standard**^Q for diagnosis of **PSC**.
- Typical cholangiographic findings of **PSC**: **Multifocal stricturing** and **beading**^Q throughout the biliary tree
- **Beaded** or **pruned tree appearance**^Q is characteristic on cholangiography.
- On ERCP **pseudodiverticula**^Q (tiny diverticulum like outpouchings) of the extrahepatic bile ducts are **nearly pathognomonic** of **PSC**, seen in **one fourth** of the cases.
- The **hepatic duct bifurcation** is the **most severely strictured**^Q segment of the biliary tree.

Treatment

- Medical therapy for **PSC** include **high dose UDCA**^Q (25–30 mg/kg/day).
- **Recurrent biliary sepsis**: Managed with **antibiotics** and surveillance
- **Biliary strictures**: Dilated or stented using either the percutaneous or endoscopic route.
- **Liver transplantation** has produced **excellent results** in **PSC** and **end-stage liver disease**^Q
- **Cholestyramine**, **Phenobarbital**, **Ursodeoxycholic acid**, **Hydroxyzine**, **Rifampin** and **Naltrexone** are the drugs approved for the treatment of **pruritus**^Q.

- **Colectomy** has **no effect on the course of PSC**^Q.

- **Smoking** is **protective** in: **PSC** and **UC**^Q
- **PSC** and **Cholangiocarcinoma** is **more common** in **males**^Q.
- **PBC** is **more common** in **females**^Q.
- **Colectomy** has **no effect on the course of PSC**^Q.

96. Ans. a. **PSC** in **UC**, the association is 30%

98. Ans. b. **Cholangiocarcinoma**

100. Ans. a. **Cholangiocarcinoma** is always **intrahepatic**

102. Ans. c. **Cirrhosis** never occurs

103. Ans. d. **PSC** reverts after a total colectomy

97. Ans. a. **Primary sclerosing cholangitis**

99. Ans. b. **Primary sclerosing cholangitis**

101. Ans. c. Most patients presents with advanced disease

- Patients with **PSC** and **ulcerative colitis** typically have a **more quiescent disease course**^Q
- The **risk for colon cancer** in these patients is **up to five times greater** than in patients with **ulcerative colitis alone**. These tumors are **more likely** to arise **proximal** to the **splenic flexure**.
- **PSC** is **progressive** and **ultimately fatal** unless **liver transplantation** is **undertaken**^Q. **Colectomy** has **no effect on the course of PSC**^Q.

104. Ans. b. **Sclerosing cholangitis**

105. Ans. d. **Primary sclerosing cholangitis** resolves after total colectomy

PRIMARY BILIARY CIRRHOSIS

106. Ans. a. Primary biliary cirrhosis (Ref: Sabiston 19/e p657; Bailey 26/e p1178-1079, 25/e p1093; Blumgart 5/e p1085-1086; Shackelford 7/e p1441)

PRIMARY BILIARY CIRRHOSIS

- Believed to be an **autoimmune etiology**, leading to **progressive destruction** of intrahepatic bile ducts^Q
- More common in **females**^Q
- Associated with autoimmune disorders (CREST, Sicca syndrome, Autoimmune thyroiditis, Renal tubular acidosis)^Q.

Pathology

- Florid duct lesion is characterized by **lymphocytic** or **granulomatous bile duct infiltration**^Q.
- In the setting of **positive AMA**, the **florid duct lesion** is **essentially diagnostic**^Q.

Clinical Features

- Most patients are **asymptomatic**, **pruritus** is the **commonest** and **earliest symptom**^Q.
- **Pruritus precedes jaundice** in PBC^Q
- **Jaundice, fatigue, melanosis**^Q (gradual darkening of exposed areas of skin), deficiency of fat soluble vitamins due to malabsorption.
- **Xanthomas** and **xanthelasmas**^Q due to protracted elevation of serum lipids.

Laboratory findings

- Increased ALP, hyperlipidemia and **positive antimitochondrial antibody**^Q.

Treatment

- **Cholestyramine** is **mainstay** of treatment of **pruritus**^Q.
- **Ursodeoxycholic acid** is associated with **significant delay** to time of transplantation^Q.
- Transplantation in PBC may also be indicated for **intolerable lethargy** or **intractable pruritus**^Q.

Prognosis

- Serum bilirubin is the **best guide** to **prognosis**^Q.

107. Ans. b. Pruritus

108. Ans. a. Generalized pruritus, c. Fatigue

109. Ans. a. No increase in risk of hepatocellular carcinoma

110. Ans. a. Pruritus

RECURRENT PYOGENIC CHOLANGITIS

111. Ans. d. GB stones are present in >50% cases (Ref: Sabiston 19/e p1501; Blumgart 5/e p680-697)
GB stones are present in <50% cases^Q.

RECURRENT PYOGENIC CHOLANGITIS

- **Cholangiohepatitis** or **intrahepatic stones** are endemic in **East Asia**^Q.
- More common in people with **poor economic status**^Q and living standards.
- Increases risk for **cholangiocarcinoma**^Q

Etiopathogenesis

- Infection is caused by **bacterial contamination**, usually **biliary pathogens**, and **biliary parasites**, such as *Clonorchis sinensis*, *Opisthorchis viverrini*, and *Ascaris lumbricoides*^Q.
- Partial obstruction of **biliary tree** caused by **biliary sludge** and **dead bacterial cell bodies**, which form **brown pigment stones**^Q

Clinical Features

- Patients present with frequent episodes of pain, fever, and jaundice.
- **Biliary strictures** and **repeated episodes of cholangitis**^Q are the common, may lead to liver abscesses and cirrhosis.
- **GB stones** are present in <50% cases^Q

Diagnosis

- MRCP and PTC:
 - **Primary imaging modalities** for monitoring of **disease progression**^Q
 - Identifying **location** and **severity** of stones and **strictures**^Q
 - Allow **decompression** of the biliary tree in a septic patient.

Treatment

- Treated with a **multidisciplinary approach** (endoscopy, interventional radiology, and surgery)
- The long-term goal of therapy is to **extract stones**, **remove debris**, and **relieve strictures**.
- **Roux-en-Y hepaticojejunostomy**^Q with a subcutaneous afferent limb (**Hudson loop**^Q) is a safe and effective way to provide **access** to the **biliary tree** for **stone extractions**^Q.

CHOLANGIOCARCINOMA PREDISPOSING FACTORS

112. Ans. d. Aflatoxin (Ref: Sabiston 19/e p1508-1509; Schwartz 10/e p1335-1338, 9/e p1162; Bailey 26/e p1114-1115, 25/e p1128-1129; Blumgart 5/e p; Shackelford 7/e p1370)

Risk factors for Cholangiocarcinoma	
<ul style="list-style-type: none"> • Choledochal cyst^Q • Primary sclerosing cholangitis^Q • Ulcerative colitis^Q • Choledocholithiasis^Q • Clonorchis sinensis and Opisthorchis viverrini^Q • Cirrhosis^Q 	<ul style="list-style-type: none"> • RPC or hepatolithiasis^Q • Biliary enteric anastomosis^Q • HBV, HIV, HCV^Q • Radon • Asbestos, Nitrosamines, Dioxin (AND)^Q • Diabetes, Obesity, OCPs, Smoking, Thorotrast, Isoniazid (DOSTI)^Q

113. Ans. b. Cholelithiasis

- Choledocholithiasis, not the cholelithiasis is a risk factor for cholangiocarcinoma^Q.

114. Ans. d. All of the above (Ref: Sabiston 19/e p1504)

ANOMALOUS PANCREATICOBILIARY DUCT JUNCTION (APBDJ)

- An anomalous pancreaticobiliary union is considered to be present when the common channel is longer than 15 mm.

Three types of APBDJ
<ul style="list-style-type: none"> • Bp Type or Type 2: Insertion of the bile duct is in the pancreatic duct • Pb Type or Type 1: Pancreatic duct appears to join the common bile duct • Y type: Long common channel

- Choledochal cyst is the MC associated abnormality^Q.
- APBDJ is seen gallbladder cancer; gallbladder adenomyomatosis; cholangiocarcinoma; and pancreatitis^Q.

115. Ans. a. PSC

116. Ans. b. Clonorchis sinensis

117. Ans. d. Chronic pancreatitis

118. Ans. None

119. Ans. a. Hydatid cyst of liver

120. Ans. None

CHOLANGIOCARCINOMA

121. Ans. c. Involvement of right branch of portal vein (Ref: Sabiston 19/e p1508-1512; Schwartz 10/e p1335-1338, 9/e p1162; Bailey 26/e p1114-1116, 25/e p1128-1129; Blumgart 5/e p771-788; Shackelford 7/e p1370-1378)

CHOLANGIOCARCINOMA

- Tumors arising from bile duct epithelium
- MC type is adenocarcinoma^Q
- Differentiated by anatomic site of origin: Intrahepatic (10%), hilar (65%)^Q and distal (25%).
- Hilar cholangiocarcinoma is also known as Klatskin tumor^Q
- MC gene mutation: K-ras >p16 (KRAP-16)^Q

Pathology

- Based on macroscopic growth pattern divided into:

Sclerosing	Nodular	Papillary
<ul style="list-style-type: none"> • MC type^Q • Causes intense desmoplastic reaction^Q • Seen as diffuse thickening of the ducts without a defined mass^Q. • This form is most difficult to treat^Q. 	<ul style="list-style-type: none"> • Result in mass lesion^Q • Usually intrahepatic^Q 	<ul style="list-style-type: none"> • Rare • Low grade adenocarcinoma • Represented by polypoidal mass filling the lumen of bile duct^Q • Minimal invasion and no desmoplastic reaction^Q. • More common in distal CBD^Q • Associated with favorable outcome^Q.

Clinical Features

- Painless jaundice (70–90%) is MC symptom^Q of cholangiocarcinoma, followed by pruritus (66%), abdominal pain, weight loss (30–50%), fever (20%).

- Distant metastasis occurs in **one third^Q** of patients.
- MC site of metastasis: **Lung or mediastinum**, liver and peritoneum.
- Tumor markers: CA19-9^Q, CEA, MUC1, MUC5AC, CK19, and CK7.
- Raised CA19-9 is a **poor prognostic factor^Q** in cholangiocarcinoma.

Diagnosis

- MRI/MRCP is an **ideal imaging^Q** modality for cholangiocarcinoma.
- Duplex ultrasonography and MRCP are the principal radiographic techniques used to image hilar cholangiocarcinoma.
- MDCT is the **first examination** in the pre-operative management of **hilar cholangiocarcinoma^Q**

Radiological Features of Cholangiocarcinoma

- **Concentric stricturing^Q**, which sometimes appears **shouldered**, polypoid appearance is rare
- Mucin producing cholangiocarcinoma can produce **strand-like filling defects^Q** caused by mucin
- Length of stricture is **at least 1 cm**
- **Golf-tree appearance** is seen in **papillary cancer^Q** involving extra-hepatic bile duct

Treatment

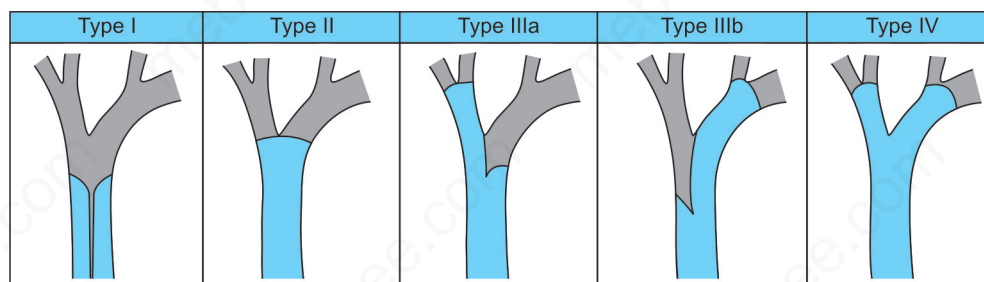
Perihilar cholangiocarcinoma	CBD resection + Lymphadenectomy + Hepatic resection ^Q
Intrahepatic cholangiocarcinoma	Hepatic resection ^Q
Distal cholangiocarcinoma	Pancreaticoduodenectomy (Whipple's procedure) ^Q

Prognosis

- Predictors of improved survival are: well-differentiated tumors; **negative-resection margin** and the performance of a **concomitant hepatic resection^Q**.
- Pattern of failure after curative resection includes peritoneal spread, hepatic metastasis, local extra-hepatic recurrence and distant metastasis (**most commonly lung**)^Q.
- Surgery is generally **not indicated** for recurrent cholangiocarcinoma^Q.

Palliation

- Chemotherapy: Gemcitabine + Cisplatin^Q is the reference regimen



Bismuth-Corlette classification of tumor involvement.

Bismuth-Corelette Classification of Hilar Cholangiocarcinoma	
Type	Criteria
I	Tumor confined to hepatic duct , not involving the main biliary confluence ^Q
II	Tumor involving the main biliary confluence but not extending to the right or left ducts ^Q
IIIa	Tumor extending upto the right secondary biliary confluence^Q
IIIb	Tumor extending upto the left secondary biliary confluence^Q
IV	Tumor extending bilaterally to the secondary biliary confluence ^Q

CRITERIA OF UN-RESECTABILITY IN HILAR CHOLANGIOCARCINOMA

- Hepatic duct involvement up to secondary radicals bilaterally^Q
- Encasement or occlusion of the **main portal vein** proximal to its bifurcation^Q
- Atrophy of one lobe with **encasement of contralateral portal vein branch^Q**
- Atrophy of one lobe with **contralateral involvement of secondary biliary radicals^Q**

- Histologically proven **metastasis to N2 lymph nodes**^Q
- **Liver, lung or peritoneal metastasis**
- In hilar cholangiocarcinoma, several **early branches of left hepatic duct drain the caudate lobe** and can be **involved early** with the tumor.
- Consideration for routine **caudate lobectomy** should be made in these cases.

PALLIATION IN CHOLANGIOCARCINOMA

Surgical Bypass

- Unresectable disease at the time of open exploration- **surgical biliary bypass offers more durable palliation**^Q
- **Segment 3 or 5 bypass** is used in patients with **advanced perihilar cholangiocarcinoma** with predominantly **right-or-left sided** disease respectively^Q.
- **Segment III bypass** yield **1-year patency rate of 80%** and it is usually **far from the main tumor** and remains **patent for a long time** despite disease progression^Q.

Stenting

- **Hilar obstructions** are best approached through the **percutaneous transhepatic route**^Q
- **Distal CBD obstruction** is stented through **endoscopy (ERCP)**^Q
- 30% of the **hepatic parenchyma drained** and functional to **alleviate jaundice and pruritus**^Q

Indications for Biliary Decompression in Inoperable Cholangiocarcinoma

- **Intractable pruritus**
- **Cholangitis**^Q
- The need of access for **intra-luminal radiotherapy**^Q
- To allow **recovery of hepatic function** in patients receiving chemotherapeutic agents^Q

NEWER TREATMENT MODALITIES IN CHOLANGIOCARCINOMA

- **Rebecamycin**^Q analogue, which is a novel antitumor antibiotic with both **topoisomerase I and II activity** as well as **DNA intercalating properties**, appeared to have promising activity, with median survival of 10 months in phase 2 study.
- **Photodynamic therapy**^Q is a new approach used to treat **endoluminal lesions of lung and esophagus**. Tumors of biliary tract frequently encroach the lumen of the bile duct, and photodynamic therapy is **being evaluated in cholangiocarcinoma**, with preliminary evidence of activity in some patients.

122. Ans. a. Division of both ducts and not extending outside 123. Ans. a. Scirrhus type has better prognosis than papillary

124. Ans. c. Common hepatic duct tumor

- Hilar cholangiocarcinoma is also known as **Klatskin tumor**^Q

125. Ans. b. Hilum

126. Ans. a. Sclerosing variety is most common

127. Ans. c. Scirrhus type

128. Ans. d. Atrophy of one lobe with ipsilateral involvement of secondary biliary radicals

129. Ans. d. Hepatic atrophy with ipsilateral bile duct involvement

130. Ans. c. Proximal cholangiocarcinoma

131. Ans. c. Bifurcation and bilateral secondary intrahepatic ducts

HEMOBILIA

132. Ans. b. Iatrogenic (Ref: Sabiston 19/e p1567-1468; Blumgart 5/e p1832-1843; Shackelford 7/e p1487)

HEMOBILIA

- Bleeding into the biliary tract from an **abnormal arterial source** to **intrahepatic biliary tract fistula**
- Portal venous bleeding into the biliary tree is rare, minor, and self-limited
- **Arterial hemobilia** is the **MC source**^Q

Etiology

- **Trauma:**
 - **Iatrogenic trauma (PTC)** is the **MC cause**^Q
 - **Blunt trauma** is more common cause than penetrating trauma

- Gallstones
- Vascular pathology: Aneurysm, angiodysplasia, hemangioma
- Uncommon causes: Malignancy, parasitic infestation, liver abscess, cholangitis

Clinical Features

- Characterized by **Quinck's triad**: GI hemorrhage + biliary colic + jaundice^Q.
- **Presentation**: Melena (90%)^Q, hematemesis (60%), biliary colic (70%), and jaundice (60%).
- Tendency for **delayed presentations** (up to weeks) and **recurrent brisk but limited bleeding** over months and even years^Q.

Diagnosis

- **Endoscopy**: First investigation^Q to be done (visualize bleeding from the ampulla of Vater)
- **Angiography**: Investigation of choice^Q (reveal the source of bleeding in 90%)
- **Transarterial embolization** is curative in major hemobilia^Q

Treatment

- Treatment is focused on **stopping bleeding** and **relieving biliary obstruction**^Q.
- Most cases of **minor hemobilia** can be **managed conservatively**^Q with correction of coagulopathy, adequate biliary drainage and close observation.

- **First line therapy** for major hemobilia: Transarterial embolization (TAE)^Q
- TAE is **curative** in major hemobilia (success rates of 80-100%)^Q
- **Surgery**: When conservative therapy and TAE have failed.

- **Surgical approaches**: Ligation of bleeding vessels, excision of aneurysm, or nonselective ligation of a main hepatic artery^Q.

133. Ans. b. Fever

134. Ans. a. Hemobilia

135. Ans. d. Hepatitis

136. Ans. b. Fever

137. Ans. a. Triad of jaundice, pain, melena

BILHEMIA

138. Ans. a. ERCP (Ref: Sabiston 19/e p1469; Blumgart 5/e p1843-1844; Shackelford 7/e p1488)

BILHEMIA

- Bilhemia is an **extremely rare condition**
- **Bile flows** into the **bloodstream** either through the **hepatic veins** or **portal vein branches**^Q

Etiology

- **High intrabiliary pressure**, exceeding that of the venous system (CBD stone)^Q
- **Gallstones** eroding into the portal vein
- Accidental or iatrogenic **trauma**

Clinical Features

- **Rapidly increasing jaundice**, **marked direct hyperbilirubinemia** (without elevation of hepatocellular enzymes) and **septicemia**^Q.
- The condition **can be fatal** secondary to **embolization** of large amounts of **bile into the lungs**^Q.
- Most often, **bile flow is low**, and the **fistula spontaneously closes**^Q.

Diagnosis

- ERCP is **investigation of choice** (diagnostic and therapeutic)^Q

Treatment

- Treatment is directed at **lowering intrabiliary pressures** either through **stents** or **sphincterotomy**^Q

139. Ans. d. Patient has hyperbilirubinemia with raised enzymes.

MISCELLANEOUS

140. Ans. b. Anterior to first part of duodenum (Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480; Schwartz 10/e p1268, 1310-1311, 9/e p1137-1138; Bailey 26/e p1097, 25/e p1111; Blumgart 5/e p43-47; Shackelford 7/e p1290-1293)

BILE DUCT: ANATOMY AND PHYSIOLOGY

Anatomy

- It lies in front of the portal vein and to the **right of the hepatic artery**^Q.
- The common hepatic duct is **1-4 cm in length** and has a **diameter** of approx. **4 mm**^Q.

- The CBD is about 7–11 cm in length and 5–10 mm in diameter^Q.
- A **fibroareolar tissue** containing **scant smooth muscle** surround the mucosa (a **distinct muscle layer is absent**)^Q.
- The most important **arteries** to the supraduodenal bile duct run parallel to the duct at the 3 and 9 o'clock^Q positions.

- Approximately 60% of the blood supply to the supraduodenal bile duct originates **inferiorly** from the **pancreaticoduodenal** and **retroduodenal arteries**^Q.
- Whereas 38% of the blood supply originate **superiorly** from the **right hepatic artery** and **cystic duct artery**^Q.

- The epithelial surface of the duct is generally flat except for **tiny pits** in the mucosa known as **sacculi of Beale**^Q, which are luminal openings for the intramural mucous glands.

Physiology

- The **wall** of the CBD contain only **thin, longitudinally oriented** layers of **smooth muscle** of which major tissue component seems to be **elastic fibers**^Q.

- The human CBD does **not have** a primary **propulsive function**, the **elastic fibers** and the **longitudinally oriented smooth muscle** provides a **tonic pressure** which help to overcome the tonic resistance of the sphincter of Oddi^Q.

- After the ingestion of a meal, bile flow across the sphincter of Oddi is promoted by inhibition or reduction in the amplitude of the phasic contraction and a decrease in the sphincter of Oddi basal pressure.
- The phasic contractions propel small volumes of bile into the duodenum but the **main function** is to **prevent reflux of duodenal contents** into either the **bile** or the **pancreatic ducts** and to maintain the ducts **free of small debris**^Q.

- **Ultrasound** measurement records the **nondistended lumen**, whereas at ERCP, contrast material produces **distension**, **intraoperative measurements** include **wall thickness**^Q.
- In general, the normal diameter of the common bile duct as determined by **ultrasound** is <6 mm, by ERCP <10 mm, and by **intraoperative extraluminal measurements** <12 mm^Q.

141. Ans. d. Usually opens into duodenum separate from the main pancreatic duct

142. Ans. c. Anteriorly related to 1st part of duodenum (Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480)

COMMON BILE DUCT

- The **common bile** or **hepatic duct** runs along the **right side of the hepatoduodenal ligament** (free edge of the lesser omentum) to the **right of the hepatic artery** and **anterior to the portal vein**^Q.
- The common bile duct **continues inferiorly** (usually 10–15 cm^Q in length and 6 mm^Q in diameter) **behind the first portion of the duodenum** and **into the head of the pancreas** in an inferior and slightly rightward direction.
- The **intrapancreatic distal CBD** then **joins with the main pancreatic duct** (of **Wirsung**), with or without a common channel, and **enters the 2nd portion of the duodenum** through the major papilla of Vater.
- At the choledochoduodenal junction, a complex muscular complex known as the **sphincter of Oddi** regulates **bile flow** and **prevents reflux of duodenal contents** into the **biliary tree**^Q.

143. Ans. a. Vessels that run upward along the bile duct from the duodenal end of the duct such as the **retroduodenal** and **gastroduodenal arteries** (Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480)

VASCULAR SUPPLY OF BILIARY TRACT

- The **supraduodenal** and **infrahilar bile duct** are predominantly **supplied by two axial vessels** that run in a 3- and 9-o'clock position^Q.

- These vessels are **derived from the superior pancreaticoduodenal, right hepatic, cystic, gastroduodenal, and retroduodenal arteries**^Q.

- It has been estimated that **only 2%** of the **arterial supply** to this portion of the bile duct is **segmental** and **arises directly** off of the **proper hepatic artery**.
- The **bile duct** and its **bifurcation** in the hilum **derive their arterial supply** from a rich network of **multiple small branches** from surrounding vessels.
- **Retropancreatic bile duct** derives its **arterial supply** from the **retroduodenal artery**.
- **Venous drainage** of the **bile duct** **parallels the arterial supply** and **drains into the portal venous system**.

- The **venous drainage** of the **gallbladder** **empties into the veins that drain the bile duct** and **does not flow directly** to the **portal vein**^Q.

144. Ans. b. Rupture of hydatid cyst (Ref: Sabiston 18th/1570; Bailey 25/e p1190)

Causes of Pneumobilia	
<ul style="list-style-type: none"> • Previous surgery (Papillotomy, choledochojejunostomy, ERCP with sphincterotomy) • Gallstone ileus • Emphysematous cholecystitis 	<ul style="list-style-type: none"> • Choledochoduodenal or cholecystocolic fistula • Tracheobiliary fistula • Suppurative cholangitis • Mirizzi's syndrome (due to cholecystoenteric fistula)

145. Ans. a. Gallstone ileus > b. Mirizzi's syndrome

146. Ans. a. 7 cm (Ref: Grays 39/e p1228)

147. Ans. c. Use of heavily T2-weighted image without contrast to create the three dimensional image of the biliary tree using MIP algorithm (Ref: Blumgart Surgery of Liver, Biliary Tract and Pancreas 5/e p315-315)

MRI cholangiography and MRI cholangiopancreatography (MRCP) are imaging techniques used to evaluate the biliary system. Heavily T2-weighted images are used to provide an overview of the biliary system and pancreatic duct.

Excellent diagnostic-quality images are obtainable, with high sensitivity and specificity for evaluation of biliary duct dilation, strictures, and intraductal abnormalities.

MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY

- The basic principle of MRCP is to use T2-weighted images, in which stationary or slowly moving fluid, including bile, is high in signal intensity; all the surrounding tissues, including retroperitoneal fat and the solid visceral organs, are lower in signal.
- MR-specific techniques for obtaining cholangiographic images include two-dimensional and three-dimensional sequences, breath-hold or non-breath-hold techniques, and respiratory gated techniques.
- MRCP plays an important role in imaging benign disorders of the biliary and pancreatic system, and it is part of a comprehensive imaging evaluation of malignancies of the biliary system.
- MRCP is noninvasive, eliminating the morbidity associated with ERCP or PTC.
- An additional advantage of MRCP includes visualization of the extrabiliary anatomy, allowing for exclusion or inclusion of alternative diagnoses.
- Surgical clips may create an artifact known as susceptibility, which may obscure the region of interest by producing areas of signal void. This artifact may mimic a stone, so caution must be used in evaluating MRCP images in postoperative patients to avoid a false-positive diagnosis.

MIP (Maximum Intensity Projection) Algorithm

- CE FAST (Fourier-acquired steady state) or FSE (Fat spinal echo) require image processing with a maximum intensity projection (MIP) algorithm, allowing rotation of summed image and display of the cholangiogram to best advantage.

Pancreas

MULTIPLE CHOICE QUESTIONS

ACUTE PANCREATITIS: ETIOLOGY AND RISK FACTORS

- Which of the following is the most common non-alcoholic cause of acute pancreatitis? (COMEDK 2008, 2007)
 - Thiazides
 - Hypercalcemia
 - Hyperlipidemia
 - Gallstones
- The commonest cause of acute pancreatitis is: (COMEDK 2008)
 - Biliary calculi
 - Alcohol abuse
 - Infective
 - Idiopathic
- Acute pancreatitis is caused by: (PGI June 2002)
 - Gallstone
 - Alcohol
 - Starvation
 - Hypercalcemia
 - Hypertriglyceridemia
- Pancreatitis may be produced by following drug: (PGI Dec 96)
 - Colchicine
 - L-Asperaginase
 - Ciprofloxacin
 - Nalidixic acid
- Common cause (s) of acute pancreatitis is/are: (PGI Dec 2000)
 - Alcohol
 - Gallstone
 - Primary biliary cirrhosis
 - L-Asperaginase
- Pancreatitis caused by: (PGI Dec 2002)
 - Ascending cholangitis
 - ↑ed PTH
 - CBD stone
 - Alcohol
 - Starvation
- Most common complication after ERCP is: (AIIMS May 2007)
 - Acute pancreatitis
 - Acute cholangitis
 - Acute cholecystitis
 - Duodenal perforation
- Post-operative pancreatitis is seen in which type of surgery? (MHSSMCET 2005)
 - Billroth type I
 - Splenectomy
 - Nephrectomy
 - Cardiopulmonary Bypass
- Which of the investigation can itself leads to acute pancreatitis? (MCI March 2005)
 - USG
 - CT scan
 - ERCP
 - MRI scan
- Which of the following is not an etiological factor for pancreatitis? (AIIMS May 2014)
 - Abdominal trauma
 - Hyperlipidemia
 - Islet cell hyperplasia
 - Germline mutations in the cationic trypsinogen gene

ACUTE PANCREATITIS: CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

- Which of the following does not cause an increase in serum amylase? (COMEDK 2008)
 - Pancreatitis
 - Carcinoma lung
 - Renal failure
 - Cardiac failure
- Poor prognostic factor in a patient with acute pancreatitis: (NEET Pattern, JIPMER 2011)
 - Leucocytosis >20,000/μL
 - ↓ serum amylase
 - ↓ serum lipase
 - Diastolic BP >90 mmHg
- A lady presents with three day history of epigastric pain radiating to back serum amylase levels were observed to be normal while USG abdomen reveals gallbladder stones and an enlarged pancreas. CT scan was done which clinched the diagnosis. Which of the following is the most likely diagnosis? (All India 2011)
 - Acute cholecystitis
 - Acute pancreatitis
 - Acute appendicitis
 - Acute peritonitis
- Medical treatment of acute pancreatitis includes:
 - Calcium
 - Glucagon (PGI Nov 2011)
 - Aprotinin
 - Cholestyramine
 - Antibiotics
- Which of the following criteria is/are not included in Ranson's scoring? (PGI Nov 2011)
 - WBC >16,000/μl
 - Serum amylase >350 IU
 - Age >55 years
 - Serum LDH >700 IU
 - Serum AST >250 U/dL
- Hyperamylasemia is seen in all except: (PGI May 2011)
 - Peritonitis
 - Acute pancreatitis
 - Carcinoma esophagus
 - Ruptured ectopic pregnancy
 - Perforated peptic ulcer
- Ranson's scoring for acute pancreatitis includes: (PGI May 2011)
 - Age >55 years
 - WBC >16,000/μL
 - Sequestration of fluid >6L
 - BUN >10 mg/dl
 - LDH >700 IU
- Which of the following is most diagnostic investigation for acute pancreatitis? (MHPGMCET 2003)
 - Serum amylase
 - Serum lipase
 - Serum P-isoamylase
 - Serum LDH

19. Which of the following is not a feature of acute pancreatitis? (DNB 2011, Orissa 2011)
 a. Hyperbilirubinemia b. Hypercalcemia
 c. Hyperglycemia d. Increased serum LDH level
20. Which of the following types of pancreatitis has the best prognosis? (APPG 2005, All India 2004)
 a. Alcoholic pancreatitis
 b. Gallstone induced pancreatitis
 c. Post operative pancreatitis
 d. Idiopathic pancreatitis
21. Which one is not the bad prognostic sign for pancreatitis? (AIIMS June 2000)
 a. TLC >16,000/ μ L
 b. Calcium <8 mmol/L
 c. Glucose >200 mg%
 d. Prothrombin >2 times the control
22. Which one is not poor prognostic factor for acute pancreatitis? (AIIMS Nov 99)
 a. Hyperglycemia b. Hypocalcemia
 c. Raised LDH level in blood d. Hyperamylasemia
23. Poor prognostic factor in acute pancreatitis is: (PGI Dec 96)
 a. Increased serum amylase b. Decreased calcium
 c. Decreased blood sugar d. Decreased PaO₂
24. Destruction of fat in acute pancreatitis is due to: (MHCET 2016)
 a. Lipase and trypsin
 b. Secretin
 c. Lipase and elastase
 d. Cholecystokinin and trypsin
25. All the following can be used to predict severe acute pancreatitis except:
 a. Glasgow score ≥ 3 b. APACHE II score ≥ 8
 c. CT severity score ≥ 6 d. C-reactive protein <100
26. Monu, a 30-years old male, a chronic alcoholic presents with sudden onset of epigastric pain that radiates to the back. All are seen except: (AIIMS June 2001)
 a. Low serum lipase b. Increased LDH
 c. Hypocalcemia d. Increased serum amylase
27. True about acute pancreatitis: (PGI June 2004)
 a. Alcohol is the MC cause
 b. 20–25% needs surgical treatment
 c. CECT is preferred over USG for diagnosis
 d. Serum Amylase is diagnostic
 e. Grey Turner sign seen around the umbilicus
28. True about acute pancreatitis are all except: (PGI Dec 2000)
 a. Gallstones and alcohol are common
 b. S. amylase levels increase after 72 hours of attack
 c. Can cause secondary pleural effusion
 d. Can present with shock
29. A 21-years old patient attended a party the previous night and gives the following symptoms, pain in abdomen radiating to back, pulse 100/min, BP 100/76; Temp 39°C and vomiting before coming. Most probable diagnosis is: (AIIMS Nov 99)
 a. Acute appendicitis b. Acute cholecystitis
 c. Acute diverticulitis d. Acute pancreatitis
30. Which of the following is true about acute pancreatitis? (PGI 88)
 a. Pain last for several hours
 b. Serum amylase levels correlates with severity of attack
 c. Common in alcoholics
 d. Low serum calcium levels indicate good prognosis
31. The following conditions are indications of surgery in acute pancreatitis, except: (UPSC 2004)
 a. Acute fluid collection
 b. Persistent pseudocyst pancreas
 c. Pancreatic abscess
 d. Infective pancreatic necrosis
32. All of the following patients presenting with abdominal pain and shock need immediate laparotomy except:
 a. Ruptured ectopic pregnancy (DPG 2009 March)
 b. Hemorrhagic pancreatitis
 c. Rupture abdominal aortic aneurysm
 d. Ruptured liver hemangioma
33. Acute pancreatitis is associated with all except: (DPG 2005)
 a. Steatorrhea b. Epigastric tenderness
 c. Upper abdominal pain d. Cullen's sign
34. A patient is admitted with severe pain in the abdomen, nausea, vomiting and fever. The most likely diagnosis is: (UPSC 97)
 a. Perforated peptic ulcer b. Intestinal obstruction
 c. Acute pancreatitis d. Acute cholecystitis
35. A 40-years old male was brought to the hospital with acute pain in the upper abdomen. Patient was in shock with feeble pulse and tachycardia. There was tenderness present in the epigastrium. There is no blood in the gastric aspirate and the patient felt better after aspiration. X-ray abdomen showed no free gas under the diaphragm. Investigations revealed TLC 13500 serum bilirubin 2.0 mg and serum amylase 800 I.U. The most likely diagnosis is: (UPSC 88)
 a. Acute cholecystitis b. Acute pancreatitis
 c. Acute appendicitis d. Acute hepatitis
36. Gasless abdomen in X-ray is a sign of: (AIIMS 91)
 a. Acute pancreatitis b. Necrotizing enterocolitis
 c. Ulcerative colitis d. Intussusception
37. Acute pancreatitis causes all of the following except: (MCI March 2005)
 a. Hypercalcemia b. Increased amylase level
 c. Subcutaneous fat necrosis d. Hyperlipidemia
38. Which of the following is not a component of APACHE score? (DNB 2012)
 a. Serum potassium b. Serum sodium
 c. Serum calcium d. Creatinine
39. Investigation of choice for acute pancreatitis: (MCI Sept 2005 and 2006)
 a. X-ray abdomen b. CT scan
 c. USG d. ERCP
40. Acute pancreatitis causes all except: (DNB 2007)
 a. Pleural effusion b. Pseudocyst
 c. Gallbladder stone d. Pancreatic necrosis
41. Serum amylase level is increased in all of the following except: (MCI March 2005)
 a. Intestinal obstruction b. Perforated ulcer
 c. Acute pancreatitis d. Acute appendicitis
42. Most common causes of death due to acute pancreatitis:
 a. Shock b. Infection (DNB 2001)
 c. Hypocalcemia d. Diabetes
43. Which of the following does not correlate with severity of acute pancreatitis? (AIIMS Nov 2011, GB Pant 2010)
 a. Serum glucose b. Serum amylase
 c. Serum calcium d. AST
44. Which of following is not associated with Pancreatitis? (JIPMER 2014, 2011)
 a. Raised serum amylase b. Raised serum lipase
 c. Hypocalcemia d. Hypoglycemia

45. CT severity index is a measure for: (Recent Questions 2013)
 a. Hepatitis b. Pancreatitis
 c. Cerebral trauma d. Meningitis
46. Balthazar scoring system is used for? (DNB 2014)
 a. Acute pancreatitis b. Acute appendicitis
 c. Acute cholecystitis d. Cholangitis

ACUTE PANCREATITIS: COMPLICATIONS

47. Grey Turner's sign (flank discoloration) is seen in: (COMEDK 2008)
 a. Acute pyelonephritis b. Acute cholecystitis
 c. Acute pancreatitis d. Acute peritonitis
48. Management of pancreatic abscess is: (UPSC 2008, AIIMS Nov 93)
 a. Needle aspiration b. Cystogastrostomy
 c. External drainage d. Cystojejunostomy
49. Which is not a feature of pancreatic ascites? (PGI June 99)
 a. Low protein
 b. Somatostatin is the drug of choice
 c. Communication with pancreatic duct in 80%
 d. Raised amylase levels
50. Cullen's sign: (UPPG 2007)
 a. Bluish discoloration of the flanks
 b. Bluish discoloration around umbilicus
 c. Migratory thrombophlebitis
 d. Subcutaneous fat necrosis
51. Vascular complications of acute pancreatitis include the following except: (UPSC 2007)
 a. Splenic vein thrombosis
 b. Splenic artery aneurysm
 c. Gastroduodenal artery aneurysm
 d. Middle colic artery thrombosis
52. Cullen's sign is seen in: (Bihar PG 2014, Kerala 94)
 a. Acute cholecystitis
 b. Acute pancreatitis
 c. Acute hemorrhagic pancreatitis
 d. Blunt injury abdomen
53. Grey Turner's sign is seen in: (MCI March 2005)
 a. Acute appendicitis b. Acute pancreatitis
 c. Acute cholecystitis d. Acute hepatitis
54. Management of infected pancreatic necrosis include all of the following except: (MCI March 2010)
 a. Percutaneous drainage
 b. Pancreatic necrosectomy
 c. Manage conservatively with antibiotics alone
 d. Nutritional support
55. All are true about pancreatic ascites except:
 a. Initial treatment is usually non-operative
 b. Somatostatin helps in decreasing secretion
 c. Repeated paracentesis is helpful (JIPMER GIS 2011)
 d. All patients respond to repeated treatment
56. All are true about pancreatic fistula except:
 a. Occasionally results in resolution of pseudocyst
 b. Fistula may be associated with severe bleeding
 c. Management depends upon GI organ involved
 d. They will never erode into duodenum (JIPMER GIS 2011)
57. All are true about acute fluid collection except:
 a. Not associated with fibrous wall (AIIMS GIS May 2008)
 b. Most are extra-pancreatic
 c. Commonly associated with hemosuccus pancreaticus
 d. Most resolve spontaneously

58. Most common metabolic complication of acute pancreatitis: (AIIMS GIS May 2008)
 a. Hyperglycemia b. Hypocalcemia
 c. Hypomagnesemia d. Hyponatremia

59. Hemorrhagic pancreatitis, bluish discoloration of flank: (Recent Questions 2013)
 a. Grey turner sign b. Cullen sign
 c. Trosseue sign d. None

CHRONIC PANCREATITIS: ETIOLOGY, CLINICAL FEATURES AND DIAGNOSIS

60. Hereditary chronic pancreatitis is caused by mutation of: (GB PANT 2010)
 a. Cationic trypsinogen or PRSS1
 b. CFTR
 c. PTSI
 d. SPINK1
61. All are true about chronic pancreatitis except:
 a. Characterized by irregularities of pancreatic ducts, duct strictures and areas of dilatation (JIPMER GIS 2011)
 b. 60–80% will give history of acute episodes
 c. CT scan showing pancreatic calcification is diagnostic of chronic pancreatitis
 d. Serum amylase is always raised
62. Most common symptom of chronic pancreatitis is: (JIPMER GIS 2011)
 a. Abdominal pain b. Cachexia
 c. Weight loss d. Steatorrhea
63. All are seen in chronic calcific pancreatitis except: (Kerala 96)
 a. Diabetes mellitus b. Fat malabsorption
 c. Hypercalcemia d. Recurrent abdominal pain
 e. Increased incidence of pancreatic carcinoma
64. Causes of chronic tropical pancreatitis is:
 a. Parasitic infection b. Cassava ingestion
 c. Idiopathic d. Genetic
65. "Chain of lakes" appearance seen in: (MHCET 2016, UPPG 2007, 2005)
 a. Acute pancreatitis b. Chronic pancreatitis
 c. Carcinoma pancreas d. Strawberry gallbladder
66. Chronic calcific pancreatitis is associated with all of the following except: (MCI Sept 2005)
 a. Hypercalcemia
 b. Diabetes mellitus
 c. Malabsorption of fat
 d. Diabetes associated complications are uncommon
67. Chronic pancreatitis seen in all except: (PGI Dec 2011)
 a. Chronic renal failure
 b. Intraductal mucinous carcinoma
 c. Alcohol
 d. Gallstones
 e. Pancreatic divisum
68. Feature of chronic pancreatitis w.r.t. pancreatic cancer:
 a. Smooth pancreatic duct dilation with an abrupt interruption (PGI May 2011)
 b. Calcification
 c. Duct penetrating sign
 d. Duct/gland width ration <0.5
 e. Dilation of bile and pancreatic duct
69. TIGAR-O classification is for: (MHSSMCET 2008)
 a. Acute pancreatitis b. Chronic pancreatitis
 c. Pancreatic cancer d. Pancreatic injuries

70. Gold standard investigation for chronic pancreatitis?
 a. MRI (DNB 2014)
 b. ERCP
 c. Pancreatic function tests
 d. Fecal fat estimation

CHRONIC PANCREATITIS: TREATMENT AND COMPLICATIONS

71. All are true about pancreatic fistula in chronic pancreatitis except: (AIIMS GIS May 2008)
 a. Most cases resolve spontaneously by conservative treatment
 b. Somatostatin is effective in fistula closure
 c. In prevention of fistula, adherence to standardized and meticulous technique is more important than the pancreatic texture or the type of anastomosis used
 d. Early intervention is required if associated with hemorrhage or sepsis
72. **Beger's procedure:** (AIIMS GIS May 2008)
 a. DPPHR
 b. LRLPJ
 c. Caudal pancreaticojejunostomy
 d. Longitudinal pancreaticojejunostomy
73. **Duval procedure in case of chronic pancreatitis involves:**
 a. Distal resection of tail of pancreas with end to end pancreaticojejunostomy (AIIMS GIS Dec 2009)
 b. Distal resection of tail of pancreas with longitudinal opening of duct and pancreaticojejunostomy
 c. Duodenum preserving pancreatic head resection
 d. Local section of pancreatic head with longitudinal pancreaticojejunostomy
74. A 50-years old lady presents with two years history of recurrent abdominal pain with radiation to her back. Pain is severe in intensity, and refractory to simple analgesics. Ultrasound and contrast enhanced CT scan (CECT) confirmed the diagnosis and showed a dilated pancreatic duct. Which of the following is the likely recommended surgical procedure of choice? (All India 2011)
 a. Vagotomy with Antrectomy
 b. Vagotomy with Gastrojejunostomy
 c. Whipple's Procedure
 d. Longitudinal Pancreaticojejunostomy
75. A chronic alcoholic presents with abdominal pain radiating to the back that responds to analgesics. At evaluation the pancreatic duct was found to be dilated and stones were noted in the tail of pancreas. The most appropriate management is: (All India 2008)
 a. Pancreatic tail resection
 b. Pancreaticojejunostomy
 c. Percutaneous removal of stone
 d. Medical management
76. Patient with chronic pancreatitis gives chain of lakes appearance in ERCP examination. Management is: (AIIMS Nov 2000)
 a. Total pancreatectomy
 b. Sphincteroplasty
 c. Side to side pancreaticojejunostomy
 d. Resecting the tail of pancreas and performing a pancreaticojejunostomy
77. Pain relief in chronic pancreatitis can be obtained by destruction of: (UPSC 87,88)
 a. Celiac ganglia
 b. Vagus nerve

- c. Anterolateral column of spinal cord
 d. None of the above

78. In a patient with chronic pancreatitis limited to tail and body with MPD diameter 4 mm, ideal treatment would be? (MHSSMCET 2007)

- a. Stenting
 b. Puestow's operation
 c. Frey's operation
 d. Distal pancreatectomy

79. Operation for chronic pancreatitis are the following except: (MHSSMCET 2009)

- a. Beger's procedure
 b. Longitudinal pancreaticojejunostomy
 c. Frey procedure
 d. None

80. Complication of chronic pancreatitis include all except: (Recent Questions 2013)

- a. Renal artery stenosis
 b. Pseudocyst
 c. Splenic vein stenosis
 d. Fistulae

81. All of the following are true about chronic pancreatitis is: (DNB 2014)

- a. Damage to exocrine part with damage to endocrine part
 b. Can leads to malignancy
 c. Whipple's procedure can be done
 d. Gallbladder stone is the most common cause

PSEUDOPANCREATIC CYST

82. True about pseudocyst pancreas: (PGI SS Dec 2009)

- a. Cyst wall is lined by squamous epithelium
 b. Endoscopic treatment may be curative
 c. Always found in lesser sac
 d. Always occur due to alcoholic pancreatitis

83. Most common complication of pseudocyst: (DNB 2003, PGI SS Dec 2009)

- a. Infection
 b. Rupture
 c. Hemorrhage
 d. Compression

84. Major complication of cysto-gastrostomy for pseudopancreatic cyst is: (DPG 2011, COMEDK 2005)

- a. Infection
 b. Obstruction
 c. Fistula
 d. Hemorrhage

85. Most common cause of pancreatic pseudocyst: (JIPMER 2010)

- a. Blunt abdominal trauma
 b. Pancreatic carcinoma
 c. Pancreatitis
 d. Post pancreatic surgery

86. Most common artery involved in pancreatic pseudoaneurysm: (PGI Nov 2009)

- a. Gastroduodenal artery
 b. Inferior pancreaticoduodenal artery
 c. Gastric artery
 d. Splenic artery
 e. Hepatic artery

87. Pseudocyst of pancreas is: (MHPGMCET 2003)

- a. Post traumatic cyst
 b. Post inflammatory cyst
 c. Congenital cyst
 d. Neoplastic cyst

88. Most common cause of pseudopancreatic cyst in children is: (All India 99)

- a. Choledochal cyst
 b. Annular pancreas
 c. Drug induced pancreatitis
 d. Traumatic pancreatitis

89. After 3 weeks of duration pancreatic pseudocyst 5 cm in size should be managed by which method? (AIIMS Nov 2000)

- a. Cystogastrostomy
 b. Needle aspiration
 c. External drainage
 d. USG and follow up

90. Which one is not true regarding pseudocyst of pancreas?

- a. Epigastric mass (AIIMS Nov 95)
 b. Increase level of amylase

- c. Cystogastrostomy is the ideal treatment
- d. Percutaneous aspiration is the treatment

91. All of the following statements about pseudopancreatic cysts are true except: (All India 97)

- a. Percutaneous aspiration is treatment of choice
- b. Cystojejunostomy is treatment of choice
- c. Serum amylase levels are increased
- d. Presents as an epigastric mass

92. All of the following are true about pseudopancreatic cyst of pancreas except: (All India 98)

- a. Common after acute pancreatitis
- b. Presents as an abdominal mass
- c. Serum amylase is increased
- d. Most common site is in head of pancreas

93. True about pseudocyst of pancreas: (PGI June 2001)

- a. Is a true cyst
- b. Common with penetrating trauma abdomen
- c. Treated with cystogastrostomy, if size >2 cm
- d. Can present from mediastinum to pubis
- e. Contains a wall of fibrous granulation tissue

94. Treatment of choice for asymptomatic pseudocyst pancreas is: (DNB 2010)

- a. Marsupialization
- b. Conservative
- c. Drainage
- d. Cystogastrostomy

95. Treatment of pseudopancreatic cyst is: (PGI June 97)

- a. Endoscopic drainage
- b. Percutaneous drainage
- c. Internal drainage (surgical)
- d. Pancreatectomy

96. Treatment of pseudocyst of pancreas include: (JIPMER 87)

- a. Cystogastrostomy
- b. Cystojejunostomy
- c. Cystocolostomy
- d. Excision of the cyst
- e. All of the above

97. The complication least likely to occur in a pseudocyst of the pancreas is: (Kerala 90)

- a. Hemorrhage
- b. Torsion
- c. Infection
- d. Carcinomatous change

98. All are features of pseudopancreatic cyst, except: (All India 97)

- a. Follows acute pancreatitis
- b. Lined by false epithelium
- c. May regress spontaneously
- d. Treatment of choice is percutaneous aspiration

99. Serious complication in pancreatic pseudocyst include all of the following except: (UPSC 97)

- a. Intra-cystic hemorrhage
- b. Secondary infection
- c. Calcification in the cyst wall
- d. Rupture of the cyst

100. Commonest complication of pseudocyst of the pancreas is: (DPG 2009 Feb)

- a. Commonest into peritoneum
- b. Rupture into colon
- c. Hemorrhage
- d. Infection

101. Which of the following is not a complication of pseudopancreatic cyst? (MCI March 2005)

- a. Malignancy
- b. Rupture
- c. Hemorrhage into cyst
- d. Infection

102. A 20-years old football player received a hard kick in the epigastrium. A large cystic swelling appeared in the epigastrium two weeks later. The most likely diagnosis is: (UPSC 96)

- a. Hydatid cyst of liver
- b. Amoebic liver abscess

- c. Pseudopancreatic cyst
- d. Hematoma of rectus sheath

CYSTIC NEOPLASMS OF PANCREAS

103. Increased amylase, mucin and CEA is seen in: (ILBS 2012)

- a. IPMN
- b. Mucinous cystadenoma
- c. Serous cystadenoma
- d. Solid pseudopapillary tumor

104. Not true about mucinous cystadenoma pancreas:

- a. Microcystic adenoma (AIIMS May 2011)
- b. Lined by columnar epithelium
- c. Premalignant
- d. Focus of ovarian stroma in it

105. A 60-years old female present with history of recurrent abdominal pain. Imaging shows multiple small cystic lesions like bunch of grapes in the head of pancreas with a grossly dilated main pancreatic duct. The most likely diagnosis is:

- a. SCN
- b. MCN (All India 2012)
- c. IPMN
- d. Pancreatic pseudocyst

106. Regarding IPMN, all are true except: (AIIMS GIS May 2011)

- a. Treatment is enucleation
- b. Can involve either main or branch duct
- c. Mostly involve pancreatic head
- d. Men and women are equally affected

107. Serous cystadenoma, all are true except:

- a. 30% are associated with malignancy
- b. Mainly microcystic (AIIMS GIS May 2008)
- c. More commonly located in the head
- d. Glycogen rich cells on cytologic examination with central calcified stellate scar

108. All are true about IPMN except: (AIIMS GIS May 2008)

- a. Seen in both small and large ducts
- b. Equal incidence in males and females
- c. Most common in head
- d. Usually diagnosed by octreotide scan

109. Not true about mucinous cystadenoma:

- a. Lining is columnar (AIIMS GIS May 2008)
- b. Ovarian stroma is found
- c. Early surgery is indicated
- d. 90% patients survive >10 years after surgery

110. All are true about pancreatic serous cystadenoma except:

- a. Increased CEA (AIIMS GIS Dec 2010)
- b. Honey comb appearance
- c. Lined by single layer of low cuboidal epithelium
- d. Malignancy is rare

111. All are true about IPMN except: (JIPMER GIS 2011)

- a. Always involves main pancreatic duct
- b. Involvement of head is most common form
- c. Men and women are equally affected
- d. Patients can experience acute pancreatitis

CARCINOMA PANCREAS: ETIOLOGY AND RISK FACTORS

112. Earliest genetic change in carcinoma pancreas: (ILBS 2012)

- a. Her-2-neu
- b. p53
- c. p16
- d. DCC

113. Not a risk factor for carcinoma pancreas: (ILBS 2012)

- a. Acute pancreatitis
- b. Diabetes
- c. Smoking
- d. Obesity

- 114. Most common mutation in pancreatic adenocarcinoma:**
 a. K-ras b. p16 (GB PANT 2010)
 c. p53 d. BRAF
- 115. Which of the following does not predispose to CA pancreas?**
 a. Familial breast cancer (AIIMS GIS May 2008)
 b. HNPCC
 c. PJS
 d. Cronkhite-Canada syndrome
- 116. Hereditary pancreatic carcinoma is associated with all except:** (AIIMS GIS Dec 2009)
 a. Ataxia Telangiectasia b. Peutz-Jegher's syndrome
 c. Hereditary pancreatitis d. FAP
- 117. Most common oncogene involved in pancreatic carcinoma is:** (AIIMS GIS Dec 2009)
 a. p53 b. K-ras
 c. APC d. DCC
- 118. Risk factors for carcinoma of pancreas include the following except:** (MHSSMCET 2006)
 a. Obesity
 b. Alcohol abuse
 c. Peutz-Jegher's syndrome
 d. History of partial gastrectomy
- 119. What will be your advice to a 60 years moderately obese patient with history of 4–6 cup of coffee per day, 4–6 glass of wine/day with 20 cigarettes per day. He is engaged as a salesman in a computer company. His brother died of pancreatic carcinoma:** (PGI June 2004)
 a. Urgent weight reduction b. Strict vegetarian diet
 c. Stop alcohol d. Stop coffee
 e. Stop cigarette smoking
- 120. False about pancreatic cancer association:** (AIIMS GIS May 2008)
 a. p53 inactivated b. K-ras activated
 c. BRCA activated d. EGF overexpression
- 121. Most common oncogene mutated in CA head of pancreas:**
 a. K-ras b. p53 (AIIMS GIS 2003)
 c. C-myc d. BRCA 2
- 122. Which is not autosomal dominant?** (AIIMS GIS May 2011)
 a. HNPCC b. FAMMM
 c. PJS d. Ataxia-Telangiectasia
- 123. Most common symptom of CA head of pancreas:** (ILBS 2012, AIIMS GIS Dec 2011, Dec 2006)
 a. Weight loss b. Pain
 c. Jaundice d. Anorexia
- 124. Diagnostic investigation in carcinoma pancreas:** (ILBS 2012)
 a. MDCT b. PET scan
 c. ERCP d. MRCP
- 125. Not true about pancreatic ductal adeno-carcinoma:**
 a. Most common site is body and tail
 b. Associated with desmoplastic changes with scattering of neoplastic glands (AIIMS GIS May 2008)
 c. Body tumors are larger
 d. Perineural invasion is characteristic feature
- 126. Scrambled egg appearance is seen in:** (COMEDK 2007)
 a. Carcinoma stomach b. Carcinoma gallbladder
 c. Pancreatic carcinoma d. Renal carcinoma
- 127. The most likely cause of fluctuating jaundice in a middle aged or elderly man is:** (COMEDK 2010)
 a. Periapillary carcinoma b. Liver fluke infestation
 c. Choledochal cyst d. Carcinoma head of pancreas
- 128. Migratory thrombophlebitis seen in:** (PGI Dec 2006)
 a. Pancreatic cancer b. Bladder cancer
 c. Stomach cancer d. Breast cancer
 e. Liver cancer
- 129. Which of the following is the most common site for the carcinoma of pancreas?** (PGI June 2000)
 a. Head b. Ampulla
 c. Body d. Tail
- 130. True about pancreatic CA:** (PGI Dec 2002)
 a. MC symptom is pain
 b. CA head of pancreas causes obstruction of both pancreatic and biliary duct
 c. Smoking predisposes
 d. Family history of familial adenomatous polyposis syndrome
- 131. True about pancreatic carcinoma:** (PGI Dec 2000)
 a. Head is the most common site
 b. Pain is the most common symptom
 c. Obstruction of bile and pancreatic secretion is common
 d. 80% cases respond well to resection
- 132. Investigation to diagnose carcinoma head of pancreas are/is:** (PGI Dec 2000, PGI Dec 2003)
 a. Hypotonic duodenogram b. X-ray abdomen
 c. USG d. Endoscopy
 e. CT Scan
- 133. A 55-years old male presents with features of obstructive jaundice. He also reports a weight loss of seven kilograms in last two months. On CT scan, the CBD is dilated till the lower end and the main pancreatic duct is also dilated. Pancreas is normal. The most likely diagnosis is:** (AIIMS Nov 2004)
 a. Choledocholithiasis b. Carcinoma gallbladder
 c. Hilar cholangiocarcinoma d. Periapillary carcinoma
- 134. Inverted "3" sign seen in:** (PGI Dec 97)
 a. Ampullary carcinoma b. Insulinoma
 c. CA head pancreas d. CA stomach
- 135. Most common tumor of pancreas is:** (UPPG 2007)
 a. Adenocarcinoma
 b. Squamous cell carcinoma
 c. Adeno-squamous cell carcinoma
 d. Ductal adenocarcinoma
- 136. The commonest pancreatic tumor is:** (TN 89)
 a. Ductal adenocarcinoma b. Cystadenoma
 c. Insulinoma d. Non islet cell tumor
- 137. Most sensitive investigation of pancreatic carcinoma is:** (PGI 88)
 a. Angiography b. ERCP
 c. Ultrasound d. CT scan
- 138. Carcinoma of pancreas is associated with:** (UPPG 2008)
 a. Hypoglycemia
 b. Syndrome of inappropriate secretion of ADH
 c. Erythropoiesis is due to erythropoietin
 d. Hypercalcemia
- 139. Elderly male with icterus having large painless gallbladder lump, diagnosis is:** (UPPG 2010)
 a. Acute hepatitis
 b. Carcinoma head of pancreas
 c. CBD stone
 d. Cholelithiasis
 e. Hepatocellular carcinoma

CA PANCREAS: CLINICAL FEATURES AND DIAGNOSIS

140. Reversed "3" sign on barium studies is seen in which condition: (MCI Sept 2009)

- Ampullary carcinoma
- Carcinoma stomach
- Carcinoma head of pancreas
- Insulinoma

141. Most common site for carcinoma pancreas is:

(Recent Questions 2013)

- Head
- Body
- Tail
- Neck

142. A 60-year-old chronic smoker presented with progressive jaundice, pruritus and clay colored stools for 2 months. History of waxing and waning of jaundice was present. A CT scan revealed dilated main pancreatic duct and common bile duct. What is the likely diagnosis?

- Carcinoma head of pancreas (AIIMS November 2015)
- Periampullary carcinoma
- Chronic pancreatitis
- Hilar cholangiocarcinoma

CARCINOMA PANCREAS: TREATMENT AND PROGNOSIS

143. Most important predictor of post-operative survival in CA pancreas: (AIIMS GIS May 2008)

- R0 resection
- DNA content
- Tumor size
- LN status

144. Most common primary leading to secondaries in pancreas:

(AIIMS GIS May 2008)

- Lung
- Breast
- Colon
- Stomach

145. Most common complication of Whipple's procedure is:

(AIIMS GIS Dec 2010)

- Delayed gastric emptying
- Bleeding
- Exocrine insufficiency
- Anastomotic leak

146. A patient with obstructive jaundice due to pancreatic cancer might have all of the following clinical findings except:

(COMEDK 2004)

- A palpable gallbladder
- Pain is early in the course of the disease
- Pulmonary metastasis
- Thrombocytopenia

147. Which of the following drugs has been found to increase the survival in locally advanced pancreatic cancer?

(COMEDK 2006)

- Doxorubicin
- Streptozocin
- Gemcitabine
- Paclitaxel

148. Middle segment pancreatectomy avoided in:

(PGI Nov 2009)

- Cystadenoma
- Tumors of head pancreas
- Tumors of tail of pancreas
- Tumor of neck of pancreas

149. Which of the following statements is not true about pancreatic carcinoma? (AIIMS May 2011, All India 2009)

- Mutation in p53 gene is associated in 75% of cases
- Hereditary Pancreatitis significantly increase the risk
- Median survival in locally advanced (stage III) disease is 3-6 months
- Five year survival after curative pancreaticoduodenectomy is 20%

150. Components of Whipple's operation are following except?

(MHSSMCET 2009)

- Gastrojejunostomy
- Duodenojejunostomy
- Choledochojejunostomy
- Pancreaticoduodenostomy

151. All are resected in Whipples operation except:

(AIIMS Nov 98, AIIMS Feb 97, All India 96)

- Duodenum
- Head of pancreas
- Portal vein
- Common bile duct

152. The preferred bypass procedure in case of non resectable carcinoma of head of pancreas is:

(MAHE 2005)

- Cholecystojejunostomy
- Cholecystogastrostomy
- Choledochoduodenostomy
- Choledochojejunostomy

153. Best prognosis for carcinoma of pancreas is in the region of:

(UPPG 2007)

- Head
- Tail
- Body
- Periampullary

154. What is the most common surgical complication following Whipple's procedure?

(UPSC 2007)

- Disruption of pancreatic anastomosis
- Biliary peritonitis
- Disruption of gastric anastomosis
- GI bleeding

155. Treatment in periampullary carcinoma is by:

(DPG 2008)

- Endoscopic stent
- Ampullectomy
- Pancreaticoduodenectomy
- Cholecystojejunostomy

156. Kocher's maneuver means:

(JIPMER 81)

- Mobilization of gallbladder during cholecystectomy
- Mobilization of 2nd part of duodenum
- Mobilization of pancreas during pancreatectomy
- Mobilization of ascending colon

157. Pancreaticoduodenectomy is the treatment of choice for:

- Duodenal carcinoma
- Pancreatic carcinoma
- Gallbladder carcinoma
- Gastric carcinoma (TN 99)

158. 5-FU is the chemotherapeutic agent of choice for all except:

(PGI 93)

- CA breast
- CA stomach
- CA pancreas
- CA colon

159. All are true about pancreatic carcinoma except:

- Ductal adenocarcinoma is the most common type
- K-ras mutation and Her-2-neu overexpression are the earliest change (JIPMER GIS 2011)
- Good prognosis
- Most cases present late

160. False about CA pancreas:

(KGMC 2011)

- Most common site is head and uncinate process
- Pain suggests unresectability
- Two third patients present with diabetes
- Acute pancreatitis never occurs in CA pancreas

161. Best tumor marker for CA head of pancreas:

- CA 19-9
- CEA (AIIMS GIS 2003)
- CA 125
- AFP

162. Best prognosis after Whipples is seen in:

(AIIMS GIS Dec 2006)

- Cholangiocarcinoma
- CA duodenum
- CA pancreas
- Ampullary carcinoma

163. Most important margin for pancreaticoduodenectomy:

(PGI SS June 2001)

- Retroperitoneal margin
- CBD
- Pancreatic duct
- Intestinal margin

164. Most common cause of death after Whipple's procedure:

(PGI SS 2004)

- Pancreatic anastomotic leak
- Biliary anastomotic leak
- Cardiopulmonary complications
- Gastric leak

165. Asymptomatic, solid 4 cm tumor of distal pancreas. Treatment:

(PGI SS Dec 2010)

- Observation
- Distal pancreatectomy with splenectomy

- c. Near total pancreatectomy with splenectomy
- d. Distal pancreatectomy alone

166. Which of the following is not a contraindication for resection of head of pancreas: (Recent Question 2015)

- a. Liver metastasis
- b. Ascites
- c. Peritoneal seedings
- d. Involvement of major artery

PSEUDOPAPILLARY TUMOR

167. All are true about pseudopapillary tumors of pancreas except:

- a. Most commonly occurs in young women
- b. Both benign and malignant varieties are seen
- c. These are small tumors (JIPMER GIS 2011)
- d. Local resection is usually curative

168. All are true about Frantz tumor except:

- a. Seen in young females (AIIMS GIS Dec 2011)
- b. Vimentin and CD 56 is positive
- c. Indolent tumor with <15% incidence of metastasis
- d. Chromagranin is positive

INSULINOMA

169. Best method of localization of insulinoma: (ILBS 2011)

- a. EUS with intra-operative palpation
- b. MRI with dynamic CT
- c. SRS
- d. CECT

170. Localization in insulinoma is best with: (COMEDK 2011)

- a. Contrast CT
- b. Magnetic Resonance Imaging
- c. Somatostatin Receptor Scintigraphy
- d. Selective arteriography

171. A 55-years old male presents with tachycardia, sweating, palpitation, giddiness. Most probable diagnosis:

- a. Insulinoma (JIPMER 2011)
- b. Zollinger-Ellison syndrome
- c. Carcinoma pancreas
- d. Carcinoid

172. All are true about insulinoma except: (PGI Nov 2009)

- a. Usually asymptomatic and need no treatment
- b. Usually small and multiple
- c. Diazoxide and octreotide reduce insulin synthesis
- d. Most common site is pancreas
- e. 90% tumors are benign

173. True about insulinoma is all except: (MHPGMCET 2003)

- a. Common equally in the pancreatic head, body and tail
- b. Hypoglycemic attacks occur
- c. Weight loss is important feature
- d. Attacks respond to glucose infusion

174. Gold standard test for insulinoma: (AIIMS May 2011)

- a. 72-hours fasting test
- b. Plasma insulin levels
- c. C-peptide levels
- d. Low glucose levels < 30 mg/dl

175. Which of the following tests is not used in the diagnosis of insulinoma? (All India 2011)

- a. Fasting blood glucose
- b. Xylose test
- c. C-peptide levels
- d. Insulin/Glucose Ratio

176. Best modality for diagnosis of insulinoma:

(PGI SS June 2007)

- a. Intra-operative USG
- b. Scintigraphy
- c. Arteriography
- d. Venous sampling

177. A lady presented with recurrent attacks of giddiness and abdominal pain since three months. Endoscopy was normal. Her fasting blood glucose was 40 mg% and insulin levels were elevated. CT abdomen showed a well defined 8 mm enhancing lesion in the head of pancreas, with no other abnormal findings. What should be the treatment plan for this patient? (All India 2010)

- a. Whipple's operation
- b. Enucleation
- c. Enucleation with radiotherapy
- d. Administration of streptozocin

178. Which of the following is the most common endocrine tumor of pancreas? (AIIMS June 2004, PGI June 2006)

- a. Insulinoma
- b. Gastrinoma
- c. VIPoma
- d. Glucagonoma

179. Insulinoma is most commonly located in which part of the pancreas? (AIIMS June 2002)

- a. Head
- b. Body
- c. Tail
- d. Equally distributed

180. Whipples triad is seen in:

(APPG 2015, WBPG 2012, DNB 2011, AIIMS Feb 97)

- a. Insulinoma
- b. Somatostatinoma
- c. Glucagonoma
- d. CA pancreas

181. Gold standard test in insulinoma: (PGI June 2000)

- a. CT scan
- b. Ultrasound
- c. MRI
- d. Arteriography

182. Which is not true regarding insulinoma? (AIIMS Nov 95)

- a. Hypoglycemic attacks
- b. Weight loss
- c. Usually solitary tumor
- d. Mostly benign tumor

ZOLLINGER-ELLISON SYNDROME

183. MC site of gastrinoma: (GB Pant 2011)

- a. Duodenum
- b. Pancreas
- c. Stomach
- d. Colon

184. All are true about gastrinoma except: (GB Pant 2011)

- a. Abnormal peptic ulcer location
- b. Diarrhea
- c. Decreased BAO and MAO
- d. Best treatment is omeprazole

185. Localization of gastrinoma is best done by: (GB Pant 2011)

- a. USG
- b. CT
- c. MRI
- d. SRS

186. All are true about gastrinoma except: (AIIMS GIS Dec 2006)

- a. Mostly found in gastrinoma triangle
- b. Increases acid production
- c. Most common site is pancreas
- d. Lymphadenectomy is not required as there is no improvement in survival

187. Least common site of gastrinoma: (AIIMS GIS May 2008)

- a. 1st part of duodenum
- b. 2nd part of duodenum
- c. 3rd part of duodenum
- d. 4th part of duodenum

188. All are true about Zollinger-Ellison syndrome except:

(DNB 2007, AIIMS GIS Dec 2011)

- a. Recurrent ulceration after acid reducing surgery
- b. Raised gastrin levels in all cases
- c. Decreased BAO/MAO
- d. Diarrhea

189. All are true about gastrinoma except: (AIIMS GIS May 2011)
 a. 50% are associated with adrenal malignancy
 b. Duodenum is the most common site
 c. Diarrhea can be prevented by NG aspiration
 d. Total gastrectomy should be avoided
190. All of the following are features of Zollinger-Ellison syndrome except: (AIIMS Nov 2005)
 a. Intractable peptic ulcers
 b. Severe diarrhea
 c. Beta cell tumors of the pancreas
 d. Very high acid output
191. Treatment of Zollinger-Ellison syndrome: (DNB 2004, All India 88)
 a. Total gastrectomy with removal of tumor
 b. Partial gastrectomy
 c. Excision of tumor alone
 d. H₂ receptor antagonist
192. The investigation of choice to detect gastrinoma <5mm size is: (COMEDK 2014)
 a. Endoscopic vctrasound
 b. Octreotide scan
 c. CT scan
 d. Portal venous sampling
193. Not a boundary of gastrinoma triangle: (DNB 2011, DPG 2007)
 a. Junction of 2nd and 3rd part of duodenum
 b. Junction of 3rd and 4th part of duodenum
 c. Junction of head with body of pancreas
 d. Junction of cystic duct with common bile duct
194. Which of the following organs is the most common site of origin of the tumor associated with the Zollinger-Ellison syndrome? (COMEDK 2011 2008, 2007)
 a. Duodenum
 b. Lymph nodes
 c. Spleen
 d. Pancreas
195. True about gastrinoma are all except: (PGI Nov 2009)
 a. Located mostly in pancreas
 b. Unusual located ulcer
 c. 90% benign
 d. Hypersecretion of gastric acid
196. All are true about Zollinger-Ellison syndrome except: (PGI June 2008)
 a. Surgery is done
 b. Exocrine tumour
 c. Endocrine disorder
 d. Secretory diarrhea seen
 e. Metastasis seen
197. A 45-years old gentleman has undergone truncal vagotomy and pyloroplasty for bleeding duodenal ulcer seven years ago. Now he has intractable recurrent symptoms of peptic ulcer. All of the following suggest the diagnosis of Zollinger Ellison syndrome, except: (AIIMS May 2006)
 a. Basal acid output of 15 meq/hour
 b. Serum gastrin value of 500 pg/ml
 c. Ulcers in proximal jejunum and lower end of esophagus
 d. Serum gastrin value of 200 pg/ml with secretin stimulation
198. Zollinger-Ellison syndrome is characterized by all of the following except: (All India 94)
 a. Post bulbar ulcer
 b. Recurrent duodenal ulcer
 c. Severe diarrhea
 d. Massive HCl secretion in response to histamine injection
199. True about ZES (gastrinoma): (PGI June 2001)
 a. Gastrin levels >1000 pg/mL
 b. BAO (Basal acid output) >15 meq/hr
 c. Somatostatin is inhibitor of HCL secretion
 d. Omeprazole is helpful
 e. Secretin increases gastrin secretion in Zollinger-Ellison syndrome
200. About ZES true is: (PGI Dec 2005)
 a. MC site is duodenal loop
 b. It is an exocrine disease
 c. It is an endocrine disease
 d. 50% are malignant
 e. Surgical excision is done
201. Zollinger-Ellison syndrome, all are true except: (PGI June 2008)
 a. Surgery is to be done
 b. Exocrine tumor
 c. Endocrine disorder
 d. Secretory diarrhea seen
 e. Metastasis seen
202. Which of the following is not true for Zollinger-Ellison syndrome? (DNB 2002, MCI Sept 2008)
 a. Recurrence after operation
 b. Reduced BAO: MAO ratio
 c. Gastrin producing tumour
 d. Diarrhea may be a presenting features
203. Diarrhoea with non healing Gastric ulcer with PPI is due to? (DNB 2014)
 a. MEN 1 syndrome
 b. Zollinger-Ellison syndrome
 c. H. pylori infection
 d. VIPom
204. A patient presented with pain in left hypochondrium, vomiting, diarrhea, melena and weight loss. Most probable diagnosis is: (Recent Question 2015)
 a. Cholangitis
 b. Enterocolitis
 c. Zollinger-Ellison syndrome
 d. Amoebiasis

ENDOCRINE TUMORS OF PANCREAS

205. Metastatic glucagonoma is best detected by:
 a. SRS
 b. CT (AIIMS GIS 2003)
 c. MRI
 d. USG
206. Most common endocrine tumor of pancreas is:
 (AIIMS GIS Dec 2006)
 a. Insulinoma
 b. Gastrinoma
 c. Somatostatinoma
 d. VIPoma
207. Best investigation for neuroendocrine tumors of pancreas:
 (AIIMS GIS Dec 2006)
 a. Portal venous sampling
 b. CECT
 c. EUS
 d. SRS
208. Migratory skin necrosis in a diabetic patient is due to:
 (AIIMS GIS Dec 2006)
 a. Somatostatinoma
 b. Glucagonoma
 c. Insulinoma
 d. VIPoma
209. Which is not true about non-functioning NET of pancreas?
 (AIIMS GIS May 2008)
 a. Most PPomas are benign
 b. Slow growing tumors
 c. Constitute 30% of all pancreatic NET
 d. Prognosis is better than other exocrine tumors
210. In VIPoma, not seen: (AIIMS GIS May 2008)
 a. Watery diarrhea
 b. Hypokalemia
 c. Hypercalcemia and hyperglycemia
 d. Increased acid secretion
211. Gallstones are associated with which NET:
 (AIIMS GIS Dec 2010)
 a. Insulinoma
 b. VIPoma
 c. Somatostatinoma
 d. Glucagonoma

212. Necrolytic migratory erythema is seen in:

(AIIMS GIS May 2011)

- a. Glucagonoma
- b. Somatostatinoma
- c. VIPoma
- d. Insulinoma

213. The triad of diabetes, gallstones and steatorrhea is associated with which one of the following tumors?

(COMEDK 2014, 2009, 2007)

- a. Gastrinomas
- b. Somatostatinomas
- c. VIPomas
- d. Glucagonomas

214. Neurotensinoma causes:

(COMEDK 2010)

- a. Cyanosis
- b. Hypertension
- c. Hyperkalemia
- d. Weight gain

215. Most cases of neuroendocrine tumors are diagnosed by:

(AIIMS GIS May 2008)

- a. SRS
- b. Portal venous sampling
- c. Arteriography
- d. CT

216. All are true about neuroendocrine tumor of pancreas:

(PGI May 2011)

- a. Insulinoma is MC
- b. VIP cause diarrhea
- c. Diarrhea is MC symptom of gastrinoma
- d. Somatostatinoma cause gall stone formation
- e. Gastrinoma has high chance of malignancy

PANCREAS DIVISUM**217. Pancreas divisum:**

(AIIMS GIS May 2008)

- a. Most common congenital anomaly
- b. Most are symptomatic
- c. Failure of fusion of dorsal and ventral pancreas
- d. Dorsal duct dilation at lesser papilla is curative

ANNULAR PANCREAS**218. All are true for annular pancreas except:**

(PGI Nov 2009)

- a. Upper GI series is IOC
- b. Duodenal obstruction present
- c. ERCP is done
- d. Non-rotation of gut
- e. Treatment is division of ring

219. Treatment of choice for annular pancreas:

(NEET Pattern, MHSSMCET 2006)

- a. Duodenojejunostomy
- b. Distal Pancreatectomy
- c. Proximal pancreatectomy
- d. Duodenoduodenostomy

220. Annular pancreas, true is:

(PGI Dec 2002)

- a. Complete or partial rotation failure
- b. Congenital
- c. Normal histology
- d. Interstitial cell proliferation
- e. Surgical correction should be done

221. Treatment of choice for annular pancreas is:

(All India 2010)

- a. Division of pancreas
- b. Duodenoduodenostomy
- c. Duodenojejunostomy
- d. Roux-en-Y loop

PANCREATIC TRAUMA**222. True about pancreatic trauma:**

(AIIMS GIS 2003)

- a. Hyperamylasemia is not specific
- b. Most common is type III and IV
- c. Type II is MPD disruption
- d. ERCP should be done in all patients

223. Which of the following is true about pancreatic injury?

(Recent Question 2015)

- a. Most cases are iatrogenic
- b. Blunt trauma is the most common cause
- c. Urine amylase is diagnostic
- d. HRCT is investigation of choice

224. Regarding injury to pancreas, which is not true?

- a. Majority of postoperative complications are due to missed duct injury (AIIMS Nov 94)
- b. Fracture is common at the junction of head and body
- c. Commonly associated with vascular injury
- d. Peritoneal lavage is good for making the diagnosis

225. True in pancreatic trauma:

(PGI June 2006)

- a. Solitary involvement common
- b. Blunt injury usual cause
- c. Always surgery needed
- d. Amylase increases in 90% cases
- e. HRCT is investigation of choice

PANCREATIC TRANSPLANTATION**226. The advantage of bladder drainage over enteric drainage after pancreatic transplantation is better monitoring of:**

(All India 2009)

- a. HBA IC levels
- b. Amylase levels
- c. Glucose levels
- d. Electrolyte levels

MISCELLANEOUS**227. Treatment of congenital cyst of head of pancreas:**

(PGI 83, AMC 86)

- a. Total excision
- b. Partial excision
- c. Marsupialization
- d. Observe and medical treatment

228. In mucoviscidosis of the pancreas the commonest defect is in the:

(JIPMER 80, AIIMS 89)

- a. Jejunum
- b. Ileum
- c. Ascending colon
- d. Descending colon

229. Leukocytic infiltration in islet cells of pancreas is characteristically seen in some cases of:

(PGI 81, AMU 87)

- a. Juvenile diabetes
- b. Diabetic ketosis
- c. Systemic mucoviscidosis
- d. Hemorrhagic pancreatic necrosis

230. Ectopic pancreatic tissue is present in all except:

(ILBS 2012)

- a. Stomach
- b. Meckel's diverticulum
- c. Mesentery
- d. Umbilicus

231. The neck of pancreas is related on its posterior surface to:

(AIIMS May 2005)

- a. Gastroduodenal artery
- b. Superior mesenteric vein
- c. Inferior vena cava
- d. Bile duct

232. Increased amylase levels in pleural fluid are seen in:

(Bihar 2003)

- a. Malignancy
- b. Pancreatitis
- c. Esophageal rupture
- d. All

233. True increase in islet cell:

(PGI Dec 2002)

- a. Nesidioblastoma
- b. Type II DM
- c. Insulinoma
- d. None

234. All of the following statements about Nesidioblastosis are true, except:

(All India 2011)

- a. Hypoglycemic episodes may be seen
- b. Occurs in adults more than children
- c. Histopathology shows hyperplasia of islet cells
- d. Diazoxide may be used for treatment

235. All of the following are true about diazoxide except:

- a. K⁺ channel opener (AIIMS May 2011)
- b. Can be used as antihypertensive agent
- c. Causes severe hypoglycemia
- d. Used in insulinoma

236. Open sphincteroplasty is done at: (MHSSMCET 2009)

- a. 12 O' clock position
- b. 11 O' clock position
- c. 6 O' clock position
- d. 2 O' clock position

237. Ectopic pancreatic tissue with islet cells are seen in:

(AIIMS GIS May 2008)

- a. Stomach
- b. Meckel's diverticulum
- c. Omentum
- d. Appendix

238. Which of the following is not true about polycystic disease of pancreas? (AIIMS GIS May 2008)

- a. Associated with liver and renal cyst
- b. 50% associated with VHL syndrome
- c. Surgical intervention is required in most because of features of chronic pancreatitis
- d. Lining of cyst wall is cuboidal

239. Which of the following types of islet cells secrete amylin?

- a. Alpha cells
- b. Beta cells (All India 2012)
- c. Delta cells
- d. F cells

240. Investigation of choice to visualise pancreas is: (DNB 2006)

- a. MRI
- b. CT Scan
- c. USG abdomen
- d. ERCP

EXPLANATIONS

ACUTE PANCREATITIS: ETIOLOGY AND RISK FACTORS

1. Ans. d. Gallstones (Ref: Sabiston 19/e p1520-1521; Schwartz 10/e p1351-1360, 9/e p1178; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p836-845; Shackelford 7/e p1123; Harrison 18/e p2635)

Causes of Acute Pancreatitis	
Common Causes	Uncommon Causes
<ul style="list-style-type: none"> • Gallstones including microlithiasis (MC)^Q • Alcohol (2nd MC)^Q • Hypertriglyceridemia^Q • ERCP^Q • Blunt abdominal trauma • Postoperative • Drugs • Sphincter of Oddi dysfunction 	<ul style="list-style-type: none"> • Vascular causes and vasculitis (ischemic-hypoperfusion states after cardiac surgery) • Connective tissue disorders • TTP^Q • CA pancreas^Q • Hypercalcemia (Hyperparathyroidism)^Q • Periapillary diverticulum • Pancreas divisum^Q • Hereditary pancreatitis • Cystic fibrosis^Q • Renal failure
Rare Causes: <ul style="list-style-type: none"> • Infections (CMV, Coxsackie, Mumps, echovirus, parasites)^Q • Autoimmune (Sjogren syndrome) 	

Causes in Recurrent Bouts of Acute Pancreatitis without an Obvious Etiology	
<ul style="list-style-type: none"> • Occult disease of the biliary tree or pancreatic ducts, especially microlithiasis, sludge^Q • Drugs • Hypertriglyceridemia^Q 	<ul style="list-style-type: none"> • Pancreas divisum^Q • Pancreatic cancer^Q • Sphincter of Oddi dysfunction^Q • Cystic fibrosis^Q • Idiopathic

2. Ans. a. Biliary calculi
 3. Ans. a. Gallstones, b. Alcohol, d. Hypercalcemia, e. Hypertriglyceridemia
 4. Ans. b. L-Asparaginase (Ref: Sabiston 19/e p1521; Schwartz 10/e p1351-1360, 9/e p1179; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p839) (MAD CAT PET TVFM)

Drugs Associated With Pancreatitis		
Definite Cause		Probable Cause
<ul style="list-style-type: none"> • 5-Aminosalicylate^Q • 6-Mercaptopurine^Q • Azathioprine^Q • Cytosine arabinoside • Dideoxyinosine • Diuretics (Furosemide, Thiazide)^Q 	<ul style="list-style-type: none"> • Metronidazole^Q • Pentamidine^Q • Tetracycline • Valproic acid^Q • Trimethoprim • sulfamethoxazole^Q • Estrogens^Q 	<ul style="list-style-type: none"> • Acetaminophen • Alpha-Methyl-dopa • Isoniazid • L-Asparaginase • Phenformin • Procainamide • Sulindac

5. Ans. a. Alcohol, b. Gallstone
 6. Ans. b. ↑ed PTH c. CBD stone, d. Alcohol
 7. Ans. a. Acute pancreatitis (Ref: Sabiston 19/e p1521; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p840; Shackelford 7/e p1123)

COMPLICATIONS OF ERCP

- Complications: Pancreatitis, hemorrhage, cholangitis and perforation.
- MC complication is acute pancreatitis (5%)^Q
- Hemorrhage requires surgical intervention most commonly, sphincterotomy usually is converted into formal surgical sphincteroplasty, which includes the bleeding artery^Q.
- Cholangitis is confined to patients in whom CBD clearance has not been achieved, and measures should be directed at providing adequate bile drainage and administering parenteral antibiotics. Emergency surgery for cholangitis carries high risk, but is indicated in patients who do not improve within 24 hours^Q.
- Perforation may be asymptomatic and noticed only as retroperitoneal gas or extravasation of radiographic contrast material, but even in symptomatic patient, conservative treatment is often effective with spontaneous resolution and avoidance of potentially difficult surgery^Q.

8. Ans. b. Splenectomy, d. Cardiopulmonary bypass (Ref: Schwartz 10/e p1352, 9/e p1179)

IATROGENIC PANCREATITIS

- Acute pancreatitis can be associated with a number of surgical procedures, most commonly those performed on or close to the pancreas, such as **pancreatic biopsy**, **biliary duct exploration**, **distal gastrectomy**, and **splenectomy**.
- Acute pancreatitis is associated postoperatively with **Billroth II gastrectomy** and **jejunostomy**, in which increased intraduodenal pressure can cause backflow of activated enzymes into the pancreas.
- **Pancreatitis** also can occur in association with surgery that uses **low systemic perfusion**, such as **cardiopulmonary bypass** and **cardiac transplantation**.

9. Ans. c. ERCP

10. Ans. c. Islet cell hyperplasia

ACUTE PANCREATITIS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

11. Ans. d. Cardiac failure (Ref: Sabiston 19/e p1519-1526; Schwartz 10/e p1351-1360, 9/e p1179-1185; Bailey 26/e p1127-1129, 25/e p1139-1144; Blumgart 5/e p841-851; Shackelford 7/e p1123-1130)

Non-Pancreatic causes of Hyperamylasemia		
<ul style="list-style-type: none"> • Burns • Pregnancy • Cholecystitis^Q • Aortic aneurysm^Q • Ruptured ectopic • Diabetic ketoacidosis 	<ul style="list-style-type: none"> • Renal transplantation^Q • Perforated Ulcer • Chronic liver disease^Q • Intestinal obstruction^Q • Renal failure^Q • Drugs: Morphine^Q 	<ul style="list-style-type: none"> • Salivary Gland Disorders: Mumps, Calculus, Maxillofacial surgery^Q • Tumors: Carcinoma of the Lung, Esophagus, Breast, Ovary (LEBO)^Q

ACUTE PANCREATITIS

- AP is **mild** and **self-limited** in most patients^Q
- **Rapidly progressive inflammatory response** associated with prolonged length of hospital stay and significant morbidity and mortality occur in **10-20%**^Q of patients
- **Mortality rate:** Mild pancreatitis <1%; Severe pancreatitis 10-30%^Q.

- **MC cause of death** in this group of patients is **multiorgan dysfunction syndrome^Q**.
- **First sign of Multi-system organ failure** in AP commonly is **impaired lung function** caused by **ARDS^Q**.

- Mortality in the **first 2 weeks (early phase)**: Due to **multiorgan dysfunction^Q**
- Mortality **after 2 weeks (late period)**: Caused by **septic complications^Q**

Pathophysiology

- AP is the final result of **abnormal pancreatic enzyme activation** inside acinar cells^Q.
- **Colocalization hypothesis**: Cathepsin B-mediated intra-acinar cell activation of the **digestive enzymes** leads to acinar cell injury and triggers an inflammatory response.

- **Intra-acinar pancreatic enzyme activation** induces **autodigestion** of normal pancreatic parenchyma.
- Acinar cells release **proinflammatory cytokines**, which propagate the response locally and systemically.

- The **local inflammatory response** further **aggravates** the **pancreatitis** because it increases the permeability and damages the microcirculation of the pancreas.
- In **severe cases**, the inflammatory response causes **local hemorrhage** and **pancreatic necrosis^Q**.
- **Inflammatory cascade** is **self-limited** in 80-90% of patients^Q.
- The **mortality** seen in the **early phase** of pancreatitis is the result of **persistent inflammatory response**.

Risk factors

- **Gallstones (MC)** and **ethanol abuse (2nd MC)** account for 70-80% of AP cases^Q.
- In **pediatric patients**, **abdominal blunt trauma** and **systemic diseases^Q** are the two most common conditions that lead to pancreatitis.

Clinical Features

- **Cardinal symptom**: Epigastric and/or periumbilical **pain** that **radiates to the back**, **relieved by sitting** and **leaning forward^Q**.
- Up to 90% of patients have **nausea** and/or **vomiting** that typically does not relieve the pain.
- The nature of the **pain** is **constant^Q**.
- Dehydration, poor skin turgor, tachycardia, hypotension, and dry mucous membranes are commonly seen in patients with AP.
- **Mild pancreatitis**: Abdomen may be normal or reveal only **mild epigastric tenderness**.
- **Severe pancreatitis**: Significant abdominal distention, associated with generalized rebound tenderness and abdominal rigidity

- **Flank (Grey Turner)^Q, periumbilical (Cullen's sign)^Q and inguinal ecchymosis (Fox sign)^Q** are indicative of **retroperitoneal bleeding** associated with **severe pancreatitis**.

- Dullness to percussion and decreased breathing sounds in the **left** or, less commonly, in the right hemithorax suggest **pleural effusion^Q** secondary to AP.

Diagnosis

- Cornerstone of the diagnosis of AP: **Clinical findings + elevation of pancreatic enzyme levels** in the plasma^Q.

Pancreatic Enzymes

- A **threefold or higher** elevation of **amylase** and **lipase** levels **confirms the diagnosis^Q**.
- **Amylase's** serum **half-life** is **shorter** as compared with lipase.
- **Lipase** is also a **more specific marker of AP^Q** because serum amylase levels can be elevated in a number of conditions, such as peptic ulcer disease, mesenteric ischemia, salpingitis, and macroamylasemia.
- Patients with AP are typically **hyperglycemic**; they can also have **leukocytosis** and **abnormal elevation of liver enzyme** levels.
- **Elevation of ALT** levels in the serum in the context of AP has a **positive predictive value of 95%** in the diagnosis of **acute biliary pancreatitis^Q**.

- **X-ray Abdomen:** Localized ileus of duodenum and proximal jejunum (sentinel loop)^Q or that of transverse colon up to its mid point (colon cut off sign)^Q.
- **IOC for acute pancreatitis:** CECT

Treatment

- **Cornerstone of the treatment:** **Aggressive fluid resuscitation^Q** using isotonic crystalloid solution with **supplementary oxygen**
- **Narcotics** are usually preferred, especially **Buprenorphine > morphine^Q** as analgesics.

In Acute Pancreatitis	
NSAIDs of choice	Metamizole ^Q
Opiate of choice	Buprenorphine ^Q

- **Nutritional support:** **Enteral nutrition^Q** is associated with less infectious complications and reduces the need for pancreatic surgery as compared to TPN.

- **ERCP:** Beneficial for patients with **severe acute biliary pancreatitis** and **cholangitis^Q**
- **Laparoscopic cholecystectomy:** Indicated for **all patients with mild acute biliary pancreatitis^Q** with the **exception of older patients and those with poor performance status^Q**

Complications of Acute Pancreatitis

• Sterile and Infected peripancreatic fluid collections	• Pancreatic ascites
• Pancreatic necrosis and Infected Necrosis	• Pancreaticopleural fistulas
• Pancreatic pseudocysts	• Vascular complications
	• Pancreatocutaneous fistula

12. Ans. a. Leucocytosis >20,000/ μ L (Ref: Sabiston 19/e p1522; Schwartz 10/e p1351-1360, 9/e p1183; Bailey 26/e p1129, 25/e p1140; Blumgart 5/e p841-844; Shackelford 7/e p1124)

ASSESSMENT OF SEVERITY OF ACUTE PANCREATITIS

- **Severe pancreatitis** is diagnosed if **three or more^Q** of the **Ranson's criteria** are fulfilled.
- The main disadvantage is that it does not predict the severity of disease at the time of the admission because six parameters are only assessed after 48 hours of admission.
- An **APACHE II score** of ≥ 8 ^Q defines **severe pancreatitis**. The main advantage is that it can be used on admission and repeated at any time.
- A **CRP level ≥ 130 mg/mL^Q** defines **severe pancreatitis**. Ranson's Prognostic Criteria

Ranson's Prognostic Criteria for Gallstone Pancreatitis	
At Admission	During Initial 48 Hours
<ul style="list-style-type: none"> • Age >70 years • WBC >18,000 cells/mm • Glucose >220 mg/ dL • Serum LDH >400 IU/L • AST >250 U/L 	<ul style="list-style-type: none"> • Hematocrit fall >10 percentage points • BUN elevation >2 mg/ dL • Serum calcium fall to <8 mg/ dL • Base deficit >5 mEq/L • Arterial PO₂ <60 mm Hg • Estimated fluid sequestration >4 Litres

- Patients with **one or two** criteria have a predicted mortality of less than **1%**, with **three** criteria (**10%**) or **four** criteria (**15%**); with more than **seven** criteria **50%**

13. Ans. b. Acute pancreatitis

14. Ans. a. Calcium, e. Antibiotics (Ref: Harrison 18/e p2640)

Medical Treatment of Acute Pancreatitis

- Analgesics (Buprenorphine, meperidine)^Q
- IV fluid and colloids^Q
- No oral alimentation
- Treatment of hypocalcemia^Q, if symptomatic
- Antibiotics^Q

Treatment of unproven value in acute pancreatitis

- Peritoneal dialysis, nasogastric decompression^Q, thoracic duct drainage,
- Plasmapheresis, anti-platelet activation factor
- Reduce gastrointestinal or pancreatic secretion (**H₂ blockers, PPI, antacids, atropine, somatostatin, glucagon, and calcitonin**)^Q
- Anti-inflammatory agents (Steroids, prostaglandins and indomethacin)
- Inhibit activated proteolytic enzymes (**Aprotinin, Gabexate mesylate**)^Q
- Others include procainamide, heparin, dextran, vasopressin^Q

15. Ans. b. Serum amylase >350 IU, d. Serum LDH >700 IU

16. Ans. None

17. Ans. a. Age >55 years, b. WBC >16000/ μ L, c. Sequestration of fluid >6L

18. Ans. b. Serum lipase

19. Ans. b. Hypercalcemia

20. Ans. b. Gallstone induced pancreatitis (Ref: Oxford textbook of surgery 2/e p1766)

- The prognosis is best in patients where pancreatitis is caused by a **remediable cause** such as **cholelithiasis**^Q.
- Eradication of gall stones prevents further attacks of pancreatitis^Q.

21. Ans. d. Prothrombin >2 times the control

22. Ans. d. Hyperamylasemia

23. Ans. b. Decreased calcium, d. Decreased PaO₂

24. Ans. a. Lipase and trypsin

25. Ans. d. C-reactive protein <100 (Ref: Sabiston 19/e p1522-1523; Bailey 26/e p1128-1129; Blumgart 5/e p841-844; Shackelford 7/e p1124)

Tools for Predicting Severity in Acute Pancreatitis Ready for Clinical Use

On Admission	At 24 Hours	At 48 Hours
APACHE-II Score $\geq 8^Q$ IL-6 Urea >60 mmol/L	Polymorphonuclear elastase Urinary trypsinogen 2 Urinary trypsinogen activation peptide	Ranson/Glasgow score $\geq 3^Q$ CRP $\geq 130^Q$ mg/mL

MODIFIED GLASGOW CRITERIA

- This system comprises eight factors. The presence of any **3 or more** within 48 hours of admission defines the patient as having severe disease.

Criteria During initial 48 Hours

- | | |
|--|--|
| <ul style="list-style-type: none"> • Age >55 years • WBC count >15,000 cell/mm • Blood urea nitrogen >45 mg/dL • Arterial PO₂ <60 mm Hg | <ul style="list-style-type: none"> • Blood glucose >180 mg/dL • Serum LDH >600 IU/L • Serum calcium <8 mg/dL • Serum albumin <3.3 g/dL |
|--|--|

ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION (APACHE)-II SCORING SYSTEM

- APACHE-II scoring system incorporates **12^Q** physiological and laboratory parameters as well as age and comorbid conditions to estimate severity of any disease process.

The 12 physiologic variables are BT ↑ HR at CWG SHOP-2

1. Mean arterial Blood pressure ^Q	5. Creatinine	9. Hematocrit
2. Temperature	6. WBC count ^Q	10. Oxygenation
3. Heart rate	7. Glasgow Coma Scale ^Q	11. Arterial pH ^Q
4. Respiratory rate	8. Sodium	12. Serum potassium

- Score ≥ 8 signifies severe, acute pancreatitis^Q
- It can be determined on a **daily basis**^Q.
- Recently modification of the APACHE-II scoring system with **addition of obesity** has been proposed.
- The APACHE-O scale, which adds one point for **body mass index (BMI)** between 25 and 30, and two points for BMI larger than 30.

Balthazar Grading System for Acute Pancreatitis (CT scan based)

Grade A	Normal pancreas ^Q
Grade B	Focal or diffuse pancreatic enlargement ^Q
Grade C	Intrinsic pancreatic alterations with peripancreatic fat inflammatory changes ^Q
Grade D	Single fluid collection/or phlegmon ^Q
Grade E	Two or more fluid collections or gas, in or adjacent to the pancreas ^Q

Computed Tomography Severity Index (CTSI) for Acute Pancreatitis

- CTSI (CT severity index scoring system) = Balthazar grade score + necrosis score
- Highest attainable score = 10^Q

Pancreatic Inflammation		Pancreatic Necrosis	
• Normal pancreas	0	• None	0
• Focal or diffuse pancreatic enlargement	1	• $\leq 30\%$	2
• Intrinsic pancreatic alterations with peripancreatic fat inflammatory changes	2	• 30%-50%	4
• Single fluid collection/or phlegmon	3	• >50%	6
• Two or more fluid collections or gas, in or adjacent to the pancreas	4		

- CTSI score:
 - 0-3: Mortality 3%, morbidity 8%
 - 4-6: Mortality 6%, morbidity 35%
 - 7-10: Mortality 17%, morbidity 92%

26. Ans. a. Low serum lipase

27. Ans. c. CECT is preferred over USG for diagnosis

- First investigation in acute pancreatitis: USG
- Best investigation in acute pancreatitis: CECT

28. Ans. b. S. amylase levels increase after 72 hours of attack

29. Ans. d. Acute pancreatitis

30. Ans. a. Pain last for several hours, c. Common in alcoholics

31. Ans. a. Acute fluid collection (Ref: Sabiston 19/e p1523)

INDICATIONS FOR OPERATIVE TREATMENT IN ACUTE PANCREATITIS

- Failure of non-operative management with at least 48 hours of maximal ICU support^Q
- Infected necrosis^Q
- Extravisceral air^Q
- Hemorrhage uncontrolled by interventional technique^Q
- Colonic complications^Q
- Operation is indicated for **documented infection** or for **sterile pancreatic necrosis**^Q with persistent systemic illness.

32. Ans. b. Hemorrhagic pancreatitis (Ref: Bailey 25/e p1144, 24/e p945,1137,1210; Sabiston 18/e p2222; Maingot's 11/e p786,977)

- All of the following patients presenting with abdominal pain and shock need immediate laparotomy except hemorrhagic pancreatitis.

Bailey says "In **peritonitis due to pancreatitis or salpingitis**, or in cases of **primary peritonitis of streptococcal or pneumococcal origin**, non-operative treatment is preferred^Q (if diagnosis can be made with certainty)."

Sabiston says "Ruptured ectopic is a surgical emergency^Q."

Definitive treatment of ruptured aortic aneurysm is operation, not monitoring and resuscitation^Q

Maingot's says regarding liver hemangioma "Intra-abdominal hemorrhage is extremely uncommon, but when does it occur, it should be considered as a life threatening emergency and treated with combination of angiography with embolization and surgery^Q."

33. Ans. a. Steatorrhea

- Steatorrhea is seen in **chronic pancreatitis**, not in acute pancreatitis.

34. Ans. c. Acute pancreatitis

35. Ans. b. Acute pancreatitis

36. Ans. a. Acute pancreatitis (Ref: Sabiston 19/e p1521; Schwartz 10/e p1351-1360, 9/e p1183; Bailey 26/e p1128, 1135, 1138, 25/e p1141; Shackelford 7/e p1123, 1136-1137)

Radiological Appearance		
Acute Pancreatitis	Chronic Pancreatitis	CA Pancreas
<ul style="list-style-type: none"> • Renal halo sign^Q • Gasless abdomen^Q • Ground glass appearance^Q • Colon cut off sign^Q • Sentinel loop^Q 	<ul style="list-style-type: none"> • Chain of lakes appearance^Q • String of pearl appearance^Q • Beaded appearance^Q • Numerous irregular calcifications^Q are pathognomonic (on X-ray) 	<ul style="list-style-type: none"> • Double contour of medial border of duodenal C loop • Double duct sign^Q • Dilated / widening of duodenal C loop^Q • Mucosal irregularity^Q • Scrambled egg appearance • Inverted / reverse 3 sign of Frostberg^Q: Seeing CA head of pancreas • Rose thorning of medial wall of 2nd part of duodenum^Q

37. Ans. a. Hypercalcemia

39. Ans. b. CT scan (Ref: Sabiston 19/e p1521; Schwartz 9/e p1183)

41. Ans. d. Acute appendicitis

43. Ans. b. Serum amylase

45. Ans. b. Pancreatitis

38. Ans. c. Serum calcium

40. Ans. c. Gallbladder stone

42. Ans. b. Infection

44. Ans. d. Hypoglycemia

46. Ans. a. Acute pancreatitis

ACUTE PANCREATITIS: COMPLICATIONS

47. Ans. c. Acute pancreatitis

Signs indicative of retroperitoneal bleeding in severe pancreatitis	
Flank ecchymosis	Grey Turner sign ^Q
Periumbilical ecchymosis	Cullen's sign ^Q
Inguinal ecchymosis	Fox sign ^Q

48. Ans. a. Needle aspiration, c. External drainage (Ref: Sabiston 19/e p1524; Schwartz 10/e p150-151, 9/e p1185; Bailey 26/e p1132, 25/e p1142; Blumgart 5/e p858; Shackelford 7/e p1127-1128)

STERILE AND INFECTED PERIPANCREATIC FLUID COLLECTIONS (PANCREATIC ABSCESS)

- The presence of **acute abdominal fluid** during an episode of **AP** has been described in **30-57%** of patients^Q.
- In contrast to pseudocysts and cystic neoplasias of the pancreas, **fluid collections are not surrounded or encased by epithelium or fibrotic capsule**^Q.
- **Treatment is supportive** because **most fluid collections** will be **spontaneously reabsorbed**^Q by the peritoneum.

- **Pancreatic Abscess:** The presence of **fever, elevated WBC count, and abdominal pain** suggest **infection** of this fluid and **percutaneous aspiration is confirmatory**^Q
- **Percutaneous drainage and IV administration of antibiotics** should be instituted if infection (**pancreatic abscess**)^Q is present

49. Ans. a. Low protein (Ref: Schwartz 9/e p1204; Bailey 26/e p1132, 25/e p1142; Shackelford 7/e p1128)

PANCREATIC ASCITES: MANAGEMENT

- Pancreatic ascites occurs from a **pancreatic duct disruption** or from a **leaking pseudocyst**.
- **High amylase levels** are found in the **ascitic fluid**^Q.
- Initial treatment: **Non-operative** (elimination of enteral feeding, institution of **nasogastric drainage**, and administration of **somatostatin**)^Q
- **Repeat paracentesis** may also be helpful.
- Roughly **50% to 60%** of patients can be **expected to respond** to this treatment with **resolution** of pancreatic ascites **within 2 to 3 weeks**^Q.

Persistent or recurrent ascites: endoscopic or surgical treatment

- **Endoscopic pancreatic sphincterotomy** with or without placement of a **transpapillary pancreatic duct stent**^Q.
- **Resection** (for leaks in the **pancreatic tail**) or **internal Roux-en-Y drainage** (for leaks in the **head and neck region**)^Q

50. Ans. b. Bluish discoloration around umbilicus

51. Ans. d. Middle colic artery thrombosis (Ref: Sabiston 19/e p1526; Schwartz 10/e p1351-1360, 9/e p1205; Bailey 26/e p1132-1133, 25/e p1144)

VASCULAR COMPLICATIONS OF ACUTE PANCREATITIS

- Acute pancreatitis is **rarely associated with arterial vascular complications**.
- **MC vessel affected: Splenic artery**^Q
- **Other vessels: Superior mesenteric, cystic, and gastroduodenal arteries**^Q

Vascular Thrombosis

- Pancreatic inflammation can produce **vascular thrombosis**
- **MC affected vessel: Splenic vein**^Q
- in severe cases, it can **extend into the portal venous system**
- Imaging demonstrates **splenomegaly, gastric varices, and splenic vein occlusion**
- **Thrombolytics** have been described in the **acute early phase**
- **Most patients** can be managed with **conservative treatment**
- **Recurrent episodes of upper gastrointestinal bleeding** caused by venous hypertension should be **treated with splenectomy**^Q

Pathogenesis

- It has been proposed that **pancreatic elastase damages the vessels**, leading to **pseudoaneurysm formation**.

Clinical Features

- **Spontaneous rupture**^Q results in massive bleeding.
- Clinical manifestations include sudden onset of **abdominal pain, tachycardia, and hypotension**.

Treatment

- If possible, **arterial embolization** should be attempted to **control the bleeding**^Q.
- **Refractory cases** require **ligation of the affected vessel**.
- The **mortality** ranges from **28-56%**.

- **MC affected vessel in acute pancreatitis: Splenic artery (pseudoaneurysm formation)**^Q
- **MC affected vessel leading to vascular thrombosis** caused by acute pancreatitis: **Splenic vein**^Q

52. Ans. c. Acute hemorrhagic pancreatitis

53. Ans. b. Acute pancreatitis

54. Ans. c. Manage conservatively with antibiotic alone (Ref: Sabiston 19/e p1524; Schwartz 9/e p1185; Bailey 26/e p1131-1132, 25/e p1142-1143; Blumgart 5/e p851; Shackelford 7/e p1127-1128)

- Another emerging concept related to the timing is the increasing use of percutaneous drainage with infected fluid collections and those with infected necrosis.

PANCREATIC NECROSIS

- Pancreatic necrosis is the presence of **nonviable pancreatic parenchyma or peripancreatic fat**
- **Up to 20%** of patients with AP develop pancreatic necrosis.
- **Most patients** who develop **multiorgan failure** have **necrotizing pancreatitis**^Q
- Pancreatic necrosis has been documented in **up to 80%** of the **autopsies of patients** who **died after an episode of AP**^Q.

- **Main complication** of pancreatic necrosis is **infection, risk is directly related to the amount of necrosis**^Q
- This complication is **associated with bacterial translocation** usually involving **enteric flora**, such as **Escherichia coli, Klebsiella**^Q, **Pseudomonas spp** and **Enterococcus spp**

Clinical Features

- **Infected pancreatic necrosis** should be suspected in patients with **prolonged fever, elevated WBC count, or progressive clinical deterioration**^Q.

Diagnosis

- **CECT** is **IOC** to **diagnose pancreatic necrosis**^Q.
- **CECT**: Typically seen as areas of **low attenuation** after the injection of IV contrast.

- **Evidence of air within the pancreatic necrosis** seen on a **CT scan confirms the diagnosis of infection**^Q

- If **infected necrosis** is suspected, **FNAC** should be performed.
- A **positive Gram stain** and/or **culture** establish the diagnosis, **positive cultures** are **confirmatory**^Q.

Treatment

- Once infection has been demonstrated, **IV antibiotics** should be given.
- Because of their **penetration into the pancreas** and **spectrum coverage**, **carbapenems (imipenam and meropenam)**^Q are the **first option** of treatment.

- **Definitive treatment for infected pancreatic necrosis is surgical débridement with necrosectomy, closed continuous irrigation, and open packaging^Q**

Outcome

- The overall mortality rate after open necrosectomy is 25-30%.

55. Ans. d. All patients respond to repeated treatment

56. Ans. d. They will never erode into duodenum (Ref: Sabiston 19/e p1525; Schwartz 9/e p1204)

PANCREATICOENTERIC FISTULA

- Pancreatic pseudocysts or areas of pancreatic necrosis can erode into the small intestine, duodenum, stomach, bile duct, or splenic flexure of the colon^Q.
- Occasionally, this results in resolution of the pseudocyst, and no further treatment is needed^Q.
- More often, such an event is accompanied by significant bleeding or signs of sepsis, and surgical intervention is usually required.
- Management of these fistulas is determined by the gastrointestinal organ involved^Q.

57. Ans. c. Commonly associated with hemosuccus pancreaticus

58. Ans. b. Hypocalcemia

- Most common metabolic complication of acute pancreatitis is hypocalcemia^Q.

59. Ans. a. Grey turner sign

CHRONIC PANCREATITIS: ETIOLOGY, CLINICAL FEATURES AND DIAGNOSIS

60. Ans. a. Cationic trypsinogen or PRSS1 (Ref: Sabiston 19/e p1527; Schwartz 9/e p1190; Bailey 26/e p1134, 25/e p1146; Blumgart 5/e p861; Shackelford 7/e p1134)

HEREDITARY PANCREATITIS

- Autosomal dominant^Q disease
- Due to a missense mutation on cationic trypsinogen, or PRSS1^Q (Protease, Serine 1) results in premature, intrapancreatic activation of trypsinogen.
- The incidence is equal in both sexes.

Clinical Features

- Characterized by recurrent episodes of acute pancreatitis or familial aggregation of chronic pancreatitis^Q
- Typically, patients first present in childhood or adolescence with abdominal pain and are found to have chronic calcific pancreatitis on imaging studies.
- Progressive pancreatic dysfunction is common, and many patients present with symptoms due to pancreatic duct obstruction^Q.
- The risk of subsequent carcinoma formation^Q is upto 40%, age of onset for carcinoma is >50 years old.

Clinical Pancreatic Syndromes and Associated Genetic Mutations

Hereditary Pancreatitis	• PRSS1 ^Q (Cationic trypsinogen) gene
Idiopathic chronic Pancreatitis	• CFTR ^Q
Tropical calcific Pancreatitis	• SPINK1 (PTSI) ^Q

61. Ans. d. Serum amylase is always raised (Ref: Sabiston 19/e p1526-1531; Schwartz 10/e p1360-1390, 9/e p1186-1198; Bailey 26/e p1134-1137, 25/e p1146-1148; Blumgart 5/e p862-870; Shackelford 7/e p1132-1138)

- Amylase and lipase levels are not always elevated in chronic pancreatitis, making the diagnosis often clinical.

CHRONIC PANCREATITIS

- Characterized by the persistent inflammation and irreversible fibrosis associated with atrophy of the pancreatic parenchyma^Q.
- Associated with chronic pain and endocrine and exocrine insufficiency^Q

- In most cases of chronic pancreatitis, exocrine insufficiency precedes endocrine insufficiency by many years^Q

- Exocrine insufficiency is more closely related with morphologic changes^Q.
- Approximately 90% of beta cell mass must be lost before clinical diabetes develops.
- Classification of various causes of chronic pancreatitis based on the TIGAR-O system^Q (TIGAR-O consist of toxic-metabolic, idiopathic, genetic, autoimmune, recurrent severe, obstructive).

Etiology

- Heavy alcohol consumption is MC cause of CP (70-80%)^Q
- Smoking increases the risk^Q of alcohol-induced CP.
- Other causes: Chronic duct obstruction, trauma, pancreas divisum, cystic dystrophy of the duodenal wall, hyperparathyroidism, hypertriglyceridemia, autoimmune pancreatitis, tropical pancreatitis, and hereditary pancreatitis (account for <10% of all cases)^Q

Pathology

- Fibrosis: Pancreatic stellate cells become activated and proliferate and transform into myofibroblast-like cells.
- Stone Formation: Pancreatic stones are composed largely of calcium carbonate crystals^Q

Clinical Features

- Classic triad: DM + Pancreatic calcification + Steatorrhea
- Abdominal pain is the primary manifestation and MC symptom of CP^Q.
- Intensity, frequency, and duration of pain gradually increase with worsening disease^Q.
- Pancreatic inflammation and fibrosis decrease the number and function of acinar cells.
 - At least 90% of the gland needs to be dysfunctional before steatorrhea, diarrhea, and other symptoms of malabsorption develop^Q
 - Exocrine insufficiency occurs in 80-90% of patients with long-standing CP^Q
- Diabetes is developed in 40-80% of patients, typically occurs many years after the onset of abdominal pain and pancreatic exocrine insufficiency^Q.

Diagnosis

- X-ray abdomen: Diffuse pancreatic calcification is seen in 30-40% cases of CP^Q
 - CT scan: Dilated pancreatic duct (68%), parenchymal atrophy (54%), and pancreatic calcifications^Q (50%). Other findings include peripancreatic fluid, focal pancreatic enlargement, biliary duct dilation, and irregular pancreatic parenchyma contour
- MRI: Detect changes in the pancreatic parenchyma suggestive of chronic inflammation, such as changes in intensity, pancreatic atrophy, and irregularities in the contour.
- MRCP with secretin injection: To evaluate intraductal strictures and pancreatic duct disruption^Q.
 - ERCP: Considered the gold standard for the diagnosis of CP, the advent of secretin MRCP and EUS have significantly decreased its role as a diagnostic test^Q
- Indications of ERCP: Other diagnostic tests are contraindicated or have failed to corroborate the diagnosis. ERCP should be considered a therapeutic modalities in patients who develop pancreatic duct complications amenable to endoscopic therapy, such as stricture, stone, pseudocysts, and biliary stenosis.
- EUS: Most accurate technique to diagnose CP in patients with minimal-change disease or in the early stages^Q.
 - Rosemont criteria^Q: Criteria on EUS required to diagnose chronic pancreatitis
- Measurement of the fecal elastase-1 level is the preferred noninvasive study to diagnose pancreatic exocrine insufficiency^Q.
- Steatorrhea: If the stool fat content exceeds 7 gm/day^Q

Treatment

- Patients should be strongly encouraged to stop drinking and smoking.
- NSAIDs are the first line of treatment, patients with severe pain should be treated with potent long-acting narcotics^Q.
- Pancreatic enzyme replacement^Q in patients with pancreatic exocrine insufficiency.
- ERCP: Primary modality for treating symptomatic pancreatic duct obstruction with dilation and polyethylene stent placement^Q.
- Endoscopic stone extraction should be considered for patients with pain and pancreatic duct dilation secondary to stones^Q.
 - Patients with a dilated pancreatic duct (diameter >7 mm) require a decompressing procedure and patients with normal pancreatic duct require a resectional procedure^Q

Cambridge Criteria for Chronic Pancreatitis on ERCP	
Stage	Typical Changes
Normal	Normal appearance of side branches and main pancreatic duct
Equivocal	Dilatation/obstruction of < 3 side branches; normal main pancreatic duct
Mild	Dilatation/obstruction of > 3 side branches; normal main pancreatic duct
Moderate	Additional stenosis and dilatation of main pancreatic duct
Severe	Additional obstructions, cysts, stenosis of main pancreatic duct; calculi

62. Ans. a. Abdominal pain

- Abdominal pain is the primary manifestation and MC symptom of chronic pancreatitis^Q.

63. Ans. c. Hypercalcemia (Ref: Sabiston 19/e p1527; Schwartz 10/e p1360, 1366-1367, 9/e p1190; Bailey 26/e p1134, 25/e p1146; Blumgart 5/e p861; Shackelford 7/e p1133; Harrison 18/e p2644)

TROPICAL (NUTRITIONAL) PANCREATITIS

- Tropical chronic pancreatitis is **highly prevalent** among **adolescents** and **young adults** raised in **Indonesia, southern India, and tropical Africa**^Q.
- Associated with **mutations of PSTI or SPINK1 gene**^Q
- It is subdivided into:
 - Tropical calcific pancreatitis**, characterized by **severe, recurrent, chronic** abdominal pain and **extensive pancreatic calcifications**^Q.
 - Fibrocalculeous pancreatic diabetes**, which is characterized by **significant pancreatic endocrine insufficiency**^Q

Etiopathogenesis

- Protein-caloric malnutrition** and **toxic products** of some **indigenous foodstuffs**^Q may contribute to the disease.

- Cassava root** contains **toxic glycosides**, increases susceptibility to **free radical injury** of the **pancreas**^Q

Clinical Features

- Abdominal pain** develops in **adolescence**, followed by the development of a **brittle form of pancreatogenic diabetes**^Q.
- Parenchymal and intraductal calcifications** are seen, and the **pancreatic duct stones** may be **quite large**^Q.
- The **accelerated deterioration of endocrine and exocrine function**, the **chronic pain due to obstructive disease**, and the **recurrence of symptoms** despite decompressive procedures **characterize the course of disease**^Q.

64. Ans. b. Cassava ingestion

65. Ans. b. Chronic pancreatitis

66. Ans. a. Hypercalcemia

67. Ans. None (Ref: Harrison 18/e p2643)

- Chronic pancreatitis is seen in all the given conditions

Chronic Pancreatitis: Tigar-O Classification System		
Toxic-metabolic	Idiopathic	Genetic
<ul style="list-style-type: none"> Alcoholic^Q Tobacco smoking^Q Hypercalcemia^Q Hyperlipidemia^Q Chronic renal failure Medications: phenacetin abuse^Q Toxins 	<ul style="list-style-type: none"> Early onset Late onset Tropical^Q 	<ul style="list-style-type: none"> Hereditary pancreatitis^Q Cationic trypsinogen^Q PRSS₁ PRSS₂ CFTR mutations^Q SPINK1 mutations^Q
Autoimmune	Recurrent and Severe Acute Pancreatitis	Obstructive
<ul style="list-style-type: none"> Isolated autoimmune chronic pancreatitis Autoimmune chronic pancreatitis associated with Sjögren's syndrome Inflammatory bowel disease Primary biliary cirrhosis 	<ul style="list-style-type: none"> Postnecrotic (severe acute pancreatitis) Recurrent acute pancreatitis Vascular diseases/ischemia Postirradiation 	<ul style="list-style-type: none"> Pancreas divisum^Q Sphincter of Oddi disorders (controversial) Duct obstruction (e.g., tumor) Preampullary duodenal wall cysts Posttraumatic pancreatic duct scars

68. Ans. b. Calcification, c. Duct penetrating sign, e. Dilation of bile and pancreatic duct (Ref: Bailey 25/e p1157; Sabiston 19/e p1528)

- Irregularity of the pancreatic duct**, **intraductal or parenchymal calcifications**, **diffuse pancreatic involvement**, and **normal or smoothly stenotic pancreatic duct penetrating through the mass (duct penetrating sign)**^Q favor the **diagnosis of chronic pancreatitis** over cancer.

69. Ans. b. Chronic pancreatitis

70. Ans. b. ERCP

CHRONIC PANCREATITIS TREATMENT AND COMPLICATIONS

71. Ans. b. Somatostatin is effective in fistula closure (Ref: Blumgart 5/e p965; Shackelford 7/e p1278-1280)

- Trials have demonstrated the **benefit of prophylactic octreotide** in the **prevention of pancreatic fistula**; however the **role of octreotide, once fistula is established** remains **unclear**^Q. In such situations, the octreotide administration is continued for upto 2 weeks, while in those who do not seem to respond, it is discontinued.

PANCREATIC FISTULA

- Output via an intra-operatively placed drain (or percutaneous drain) of any measurable volume or drain fluid on or after post-operative day 3, amylase >3 times of normal serum value.
- Pancreatic fistula classified into **low output** (<200 mL/day) and **high output** (>200 mL/day).

Factors known to influence the outcome of a Pancreatic Anastomosis

• Texture of the pancreatic remnant ^Q	• Caliber of the main pancreatic duct ^Q
• Exocrine pancreatic juice output ^Q	• Surgical technique applied ^Q

- **Texture of Pancreatic Remnant:** Performing an anastomosis on a **soft pancreas** is **more difficult** than on a firm or hard pancreas. Thus, a **pancreatic anastomosis** in **chronic pancreatitis** has a **lower risk** of anastomotic failure compared to **pancreatic cancer**^Q.
- **Pancreatic Juice Output:** **Decreased juice output** is associated with a **lowered risk** of anastomotic failure^Q.
- **Surgical Technique:** An **end-to-side pancreaticojejunostomy** irrespective of the caliber of the main pancreatic duct and the texture of the pancreatic parenchyma.

Management

- Most cases resolve spontaneously by conservative treatment^Q
- Benefit of **prophylactic octreotide** in the **prevention** of **pancreatic fistula**^Q
- Role of octreotide, once a fistula is established remains unclear^Q.

72. Ans. a. DPPHR (Ref: Sabiston 19/e p1529-1531; Schwartz 10/e p1360-1390, 9/e p1210; Blumgart 5/e p875-881; Shackelford 7/e p1138-1142)

RESECTION PROCEDURES IN CHRONIC PANCREATITIS

- It is believed that **inflammatory process** in the **pancreatic head** controls both the severity of symptoms and further progression of disease in remainder of the gland
- **Pancreatic head** is **pacemaker** of **chronic pancreatitis**^Q.
- Because of this **resection of pancreatic head** has been shown to **completely relieve** the **pain** of chronic pancreatitis in **70-80%** patients.
- **Distal pancreatectomy** is the ideal procedure for patients whose **chronic pancreatitis** is confined to **pancreatitis tail**^Q.
- Usually, **distal pancreatectomy** is combined with **splenectomy** for technical reasons, but spleen can be preserved if its vascular supply is secure.

Surgical Procedures in Chronic Pancreatitis

Drainage Procedure	Resection Procedure
<ul style="list-style-type: none"> • Puestow Procedure^Q (Longitudinal Pancreaticojejunostomy): Resection of the tail followed by a longitudinal pancreaticojejunostomy^Q • Partington and Rochelle Modification of Puestow Procedure: Elimination of the resection of the pancreatic tail^Q. • Duval Procedure: Distal pancreatectomy with Roux-en-Y pancreaticojejunostomy (caudal PJ)^Q 	<ul style="list-style-type: none"> • Beger's Procedure (Duodenal Preserving Pancreatic Head Resection DPPHR^Q) • Warren's modification of Beger's procedure • Frey's Procedure (Local Resection of the Head of the Pancreas Combined with Longitudinal Pancreaticojejunostomy LR-LPJ)^Q • Berne modification: (Combines some aspects of Beger's and Frey's) • Hamburg modification of Frey's

Surgical Procedures in Chronic Pancreatitis

- **Ideal procedure:** **DPPHR**^Q (**Beger's**)
- In presence of **portal vein thrombosis:** **Frey's**^Q
- **Small duct disease:** **V-shaped excision**^Q
- **Disease recurrence in body and tail** (after DPPHR, Whipples or Longmire-Traverso procedure): **V-shaped drainage**^Q
- **Disease limited to tail:** Spleen-preserving **distal pancreatectomy**^Q

73. Ans. a. Distal resection of tail of pancreas with end to end pancreaticojejunostomy

74. Ans. d. Longitudinal Pancreaticojejunostomy

- **Drainage procedure** in the form of **longitudinal pancreaticojejunostomy** is the surgical **treatment of choice** for **chronic pancreatitis** with **dilated ducts**^Q.

75. Ans. d. Medical management

- The patient has **non-disabling pain** that has **responded to analgesia**. Such patients should be best **managed by non-operative means**. **Medical management** is the best option.
- In the patients having **severe pain, not relieved by analgesics** with similar situation should be best **managed with longitudinal pancreaticojejunostomy**.

76. Ans. c. Side to side pancreaticojejunostomy

77. **Ans. a. Celiac ganglia** (Ref: Sabiston 19/e p1529; Schwartz 9/e p1206; Bailey 26/e p1135, 25/e p1147; Blumgart 5/e p873; Shackelford 7/e p1137; Harrison 18/e p2646)

CHRONIC PANCREATITIS

- **Pain from the pancreas** is carried in **sympathetic fibers** that traverse the **celiac ganglia**, reach the sympathetic chain through the splanchnic nerves, and then ascend to the cortex
- **Celiac plexus nerve blocks**^Q performed either **percutaneously** or **endoscopically** have been employed to **abolish this pain** with inconsistent results

78. **Ans. d. Distal pancreatectomy**

79. **Ans. d. None**

80. **Ans. a. Renal artery stenosis**

81. **Ans. d. Gallbladder stone is the most common cause**

PSEUDOPANCREATIC CYST

82. **Ans. b. Endoscopic treatment may be curative** (Ref: Sabiston 19/e p1524-1525, 1531; Schwartz 9/e p1200-1203; Bailey 26/e p1133-1134, 25/e p1144-1145; Shackelford 7/e p1144-1148)

PSEUDOPANCREATIC CYST

- A chronic collection of pancreatic fluid surrounded by a **nonepithelialized wall of granulation tissue and fibrosis**^Q
- Pseudocysts account **75% of cystic lesions**^Q of the **pancreas**.
- **MC complication of chronic pancreatitis**^Q

- Located anywhere from the **mediastinum** to the **scrotum**^Q
- Found **most often** in the **lesser sac**^Q or **anterior pararenal space**
- **Traumatic pseudocysts** tend to occur **anterior to the body**^Q of the gland
- **Chronic pancreatitis pseudocysts** are commonly located **within the substance** of the gland

- **Incidence of Pseudocysts:**
 - **Acute pancreatitis**-10-20% of patients^Q
 - **Chronic pancreatitis**- 20-40% of patients
- **Multiple** in 17%^Q cases
- **Alcohol** is the **MC cause of pancreatitis related pseudocysts**^Q.

Pathophysiology

- **Pancreatic duct leak** with extravasation of pancreatic juice results in a pancreatic fluid collection (PFC).
- **Acute pseudocyst:** Over a period of **3 to 4 weeks**^Q, the PFC is sealed by an inflammatory reaction that leads to development of a wall of acute granulation tissue without much fibrosis.
- Acute pseudocysts may **resolve spontaneously** in up to **50% of cases**, over a course of **6 weeks** or longer^Q.
- **Pseudocysts >6 cm** resolve **less frequently** than smaller ones but may regress over a period of weeks to months^Q.

Clinical Features

- Pseudocysts usually cause symptoms of pain, fullness, or early satiety.

- **Abdominal pain** is **MC symptom**^Q, occurs in up to 90% of patients
- Other common symptoms include **early satiety**, **nausea** and **vomiting** (50% to 70%), **weight loss** (20% to 50%), **jaundice** (10%), and low-grade fever (10%)^Q

- **Physical examination:** **Upper abdominal tenderness** in the majority of patients, and **25-45%** will have a **palpable abdominal mass**^Q.
- The symptoms of early satiety, nausea, and vomiting may be secondary to gastroduodenal obstruction caused by a mass effect of the pseudocyst.

Diagnosis

- No definitive laboratory findings are available to establish a diagnosis of pancreatic pseudocyst.
- **Elevated serum amylase and lipase**^Q concentrations may occur in **half** of these patients.
- **Persistently elevated amylase** after resolution of acute pancreatitis should prompt investigation for a pseudocyst.
- **CECT abdomen** is **investigation of choice**^Q for diagnosis of a pancreatic pseudocyst.

Treatment

- Pseudocyst **5 cm** in diameter and **<6 weeks** old should be **observed**^Q, as they tend to **resolve spontaneously**^Q.
- **Pseudocyst >5 cm** diameter is an indications for **drainage**^Q

- If **infection** is suspected, the pseudocyst should be **aspirated**^Q (not drained) by CT- or US-guided FNA, and the contents examined for organisms by Gram's stain and culture
- If **infection** is present, and the **contents** resemble **pus**, **external drainage** is employed, using either surgical or percutaneous techniques

- Pseudocysts **communicate with the pancreatic ductal system** in up to 80% of cases, so external drainage creates a pathway for pancreatic duct leakage to and through the catheter exit site.
- **Methods of Internal drainage:**
 - **Percutaneous** catheter-based methods (transgastric puncture and stent placement to create a cystogastrostomy)
 - **Endoscopic** methods (transgastric or transduodenal puncture and multiple stent placements, with or without a nasocystic irrigation catheter)
 - **Surgical methods** (a true cystoenterostomy, biopsy of cyst wall, and evacuation of all debris and contents)
- **Surgical options:** Cystogastrostomy, Roux-en-Y cystojejunostomy, cystoduodenostomy.
- **Preferred modality:** Internal drainage of cyst by cystojejunostomy^Q

(Shackelford 7/e p1159)

Pseudocyst Complications (Shackelford 7th/1159)	
• Infection (MC)^Q: 14%	• Duodenal obstruction
• Pain due to expansion	• Rupture
• Hemorrhage: upto 10%	• Abscess

The D'EGIDIO classification of Pancreatic Pseudocyst				
	Context	Pancreatic Duct	Duct-pseudocyst Communication	Treatment
Type I	Acute post-necrotic pancreatitis	Normal	No	Percutaneous drainage
Type II	Acute-on Chronic pancreatitis	Abnormal (no stricture)	50:50	Internal drainage or resection
Type III	Chronic pancreatitis	Abnormal (stricture)	Yes	Internal drainage with duct decompression

- Cystojejunostomy has a **slightly lower recurrence rate**, but it is associated with significantly **more blood loss** and operative time

83. Ans. a. Infection

84. Ans. d. Hemorrhage (Ref: CSDT 11/e p638)

- Serious post-op hemorrhage from cyst occurs from cystogastrostomy^Q.

85. Ans. c. Pancreatitis

86. Ans. d. Splenic artery (Ref: Maingot 11/e p977)

ARTERY INVOLVED IN PSEUDOANEURYSM ASSOCIATED WITH PANCREATIC PSEUDOCYST

- Splenic artery (30-50%): **Most common^Q**
- Gastroduodenal artery (10-15%)
- Inferior and superior pancreaticoduodenal artery (10%)

87. Ans. b. Post inflammatory cyst

88. Ans. d. Traumatic pancreatitis

- Trauma is the most common cause of acute pancreatitis in children.

PANCREATIC TRAUMA IN CHILDREN

- **MC mechanism** in children is **abdominal blunt trauma^Q**.
- Direct compression of the epigastrium against the vertebral column and a blunt object (**handlebar**) is typically seen after **bicycle injuries^Q**.
- **MC segment** of the pancreas affected is the **body^Q**.

89. Ans. d. USG and follow up

90. Ans. d. Percutaneous aspiration is the treatment

91. Ans. a. Percutaneous aspiration is treatment of choice

92. Ans. d. Most common site is in head of pancreas

- Most common site of pancreatic pseudocyst is **lesser sac^Q**

93. Ans. d. Can present from mediastinum to pubis, e. Contains a wall of fibrous granulation tissue

94. Ans. b. Conservative

95. Ans. a. Endoscopic drainage, b. Percutaneous drainage, c. Internal drainage (surgical), d. Pancreatectomy (Ref: Sabiston 19/e p1524-1525; Bailey 26/e p1133-1134, 25/e p1145; Shackelford 7/e p1148)

MANAGEMENT OPTIONS FOR PANCREATIC PSEUDOCYSTS

- Observation
- Percutaneous aspiration/drainage^Q
- Endoscopic aspiration/drainage^Q
- Transpapillary endoscopic drainage or stenting^Q
- Operative approaches (open or laparoscopic)^Q
 - Internal drainage
 - External drainage
 - Resection

96. Ans. a. Cystogastrostomy, b. Cystojejunostomy, d. Excision of the cyst

97. Ans. d. Carcinomatous change

98. Ans. d. Treatment of choice is percutaneous aspiration

99. Ans. c. Calcification in the cyst wall

100. Ans. d. Infection

101. Ans. a. Malignancy

102. Ans. c. Pseudopancreatic cyst

CYSTIC NEOPLASMS OF PANCREAS

103. Ans. a. IPMN (Ref: Sabiston 19/e p1533-1534; Schwartz 9/e p1234; Blumgart 5/e p903-905; Shackelford 7/e p1220-1222)

INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM

- IPMN is also known as **mucin-secreting carcinoma**^Q, villous adenoma of the duct of Wirsung
- Seen in 6th to 7th decade of life
- More common in **head** and **uncinate process**^Q of the pancreas
- Equal sex distribution^Q

Types of IPMN

- **Side branch IPMN**: Involves dilation of the pancreatic duct side **branches**
- **Main duct IPMN**: Abnormal cystic dilation of the **main pancreatic duct**
- **Mixed-type IPMN**: Side branch IPMN that has extended to involve the **main pancreatic duct**

Pathology

- Occur within the **head** of the pancreas and arise **within** the **pancreatic ducts**^Q.
- **Ductal epithelium** forms a **papillary projection** into the duct
- **Mucin production** causes **intraluminal cystic dilation**^Q of the pancreatic ducts
- Careful histologic examination of the entire specimen (**invasive component** in 35-40%)^Q

Clinical Features

- Patients are usually in their 6th to 7th decade
- Present with **abdominal pain** or **recurrent pancreatitis**, thought to be caused by obstruction of the pancreatic duct by **thick mucin**^Q.
- Some patients (5-10%) have **steatorrhea**, **diabetes**, and **weight loss** secondary to pancreatic insufficiency.

- **Predictors of malignancy**: Jaundice, elevated serum ALP, mural nodules, diabetes, and main pancreatic duct diameter ≥ 7 mm^Q

Diagnosis

- **Endoscopy**: Mucus extruding through a large, **fish-mouth** like papillary orifice is **virtually diagnostic** of IPMN^Q
- **CT scans**: Dilated **main pancreatic duct**, cysts of varying sizes, and possibly **mural nodules**^Q
- **Aspirated fluid**: Mucinous content with **elevated CEA** and **amylase level**^Q

Pre-operative localization is problematic in IPMN

- Over production of mucous, dilation can occur **proximal and distal** to the tumor^Q
- Propensity of tumor to spread **microscopically** along the duct^Q

Treatment

- **Partial pancreatectomy**: For **main duct**, **symptomatic**, and **large branch-type IPMNs** (>3 cm), or IPMNs with an **invasive component**^Q
- **Observation**: For **asymptomatic small** (<3 cm) **branch duct IPMNs** without associated nodularity.

Prognosis

- **Local anatomic resection** is essentially **curative** for **branch duct IPMN**
- **Recurrence** in the remnant gland is upto 10% in **main duct IPMN**
- **IPMN with invasive carcinoma**: 5 and 10-year survival is 60% and 50% (**better than pancreatic adenocarcinoma**)

104. Ans. a. Microcystic adenoma (Ref: Sabiston 19/e p1532-1533; Schwartz 10/e p 1410-1413, 9/e p1232; Blumgart 5/e p902-903; Shackelford 7/e p1218-1220)

- Mucinous cystadenoma is macrocystic, not the microcystic adenoma.

MUCINOUS CYSTADENOMA OF PANCREAS

- MCN: MC cystic neoplasm^Q of the pancreas
- Frequently seen in **young women**, mean age 5th decade^Q
- More common in the **body** and **tail** of the pancreas

Pathology

- MCNs contain **mucin-producing epithelium**^Q, macrocystic
- Histology: Presence of **mucin-rich cells** and **ovarian-like stroma**^Q
- **Estrogen** and **progesterone staining** are **positive** in **most cases**^Q

Clinical Features

- Incidental MCN is becoming increasingly common
- Up to 50% of patients present with **vague abdominal pain**.
- A **history of pancreatitis** may be found in up to 20% of patients, which explains the common misdiagnosis of pseudocyst.

Diagnosis

- **CT scan**: Presence of a **solitary cyst** with **fine septations** and **rim of calcification**^Q
- **Cross-sectional imaging** may **not** be able to **distinguish** between **benign** and **malignant MCNs**

- Presence of **eggshell calcification**, **larger tumor size**, or a **mural nodule** on cross-sectional imaging is **suggestive of malignancy**^Q
- **Cyst fluid analyses**: **Mucin-rich** aspirate, **high CEA** and **low amylase** levels^Q

- These fluid analyses provide accurate diagnosis in up to 80% of cases

Treatment

- Exclusion of malignancy can't be obtained by biopsy alone, so **surgical excision** is **indicated** for **all mucinous cystic neoplasms**^Q, because extensive histological sampling is required for confirmation
- **Pancreatic resection** is the **standard treatment** for MCNs^Q.
- In the absence of invasive malignancy, resection is curative and no further surveillance is required

105. Ans. c. Intraductal papillary mucinous neoplasm

106. Ans. a. Treatment is enucleation

107. Ans. a. 30% are associated with malignancy (Ref: Sabiston 19/e p1533; Schwartz 10/e p 1409-1410, 9/e p1232; Blumgart 5/e p902; Shackelford 7/e p1217-1218)

SEROUS CYSTADENOMA OF PANCREAS

- SCNs usually occur in the **head**^Q of the pancreas
- Affect **women** almost **exclusively**^Q
- Most are **benign** and have **no malignant potential**^Q

Pathology

- SCNs are **large**^Q, well-circumscribed masses (**microcystic**)
- Microscopic examination reveals **multiloculated**, **glycogen-rich** small cysts^Q
- Typically have **small cyst**^Q filled with clear fluid with **spongelike** or **honeycomb appearance**^Q.

Clinical Features

- Most are **asymptomatic**^Q
- Patients commonly present with **vague abdominal pain**^Q and less frequently with weight loss and obstructive jaundice.

Diagnosis

- Aspiration from cyst yields **non-viscous fluid** with **low CEA** and **low amylase** levels^Q.

- **Central calcification** gives rise to a characteristic **central sunburst**^Q, **radial**, or **stellate scar pattern** on **CT scan**^Q (10-20%)

Treatment

- SCN is benign, resection is indicated when **diagnosis** is **in doubt** or when they become **symptomatic**^Q, size >4 cm

108. Ans. d. Usually diagnosed by octreotide scan

109. Ans. d. 90% patients survive >10 years after surgery

110. Ans. a. Increased CEA

111. Ans. a. Always involves main pancreatic duct (Ref: Sabiston 19/e p1533; Blumgart 5/e p902-908; Shackelford 7/e p1228)

Cystic Neoplasm of Pancreas			
Characteristics	SCN	MCN	IPMN
Gender	F >> M ^a (4:1)	F >>> M ^a (10:1)	F = M ^a
Age (years)	60-70	50-60	60-70
Location	Head ^a	Body and tail ^a	Head ^a
Appearance	Multiple small cysts (microcyst) separated by internal septations with central sunburst calcifications ^a	Thick-walled, septated macrocyst ^a with smooth contour; ± solid component, egg-shell calcifications ^a	Poorly demarcated, lobulated, polycystic mass with dilation of main or branch ducts ^a
Communication with ducts	No	No	Yes ^a
Cytology	Scant glycogen-rich cells, with positive Periodic Acid Schiff stain ^a	Sheets and clusters of columnar, mucin-containing cells	Tall, columnar mucin-containing cells
Mucin stain	Negative	Positive ^a	Positive ^a
Amylase	Low	Low	High ^a
CEA	Low	High ^a	High ^a

CARCINOMA PANCREAS: ETIOLOGY AND RISK FACTORS

112. Ans. a. Her-2-neu (Ref: Sabiston 19/e p1535-1536; Schwartz 9/e p1219-1220; Bailey 26/e p1137, 25/e p1148-1152; Blumgart 5/e p912-918; Shackelford 7/e p1187-1189)

- K-ras mutations and HER2/neu over expression are the earliest changes to occur in pancreatic carcinoma^a

RISK FACTORS FOR PANCREATIC CARCINOMA

- There is association between risk of pancreatic cancer, H. pylori colonization, and ABO blood groups^a.
- Older age, African American race, low socioeconomic status, Ashkenazic jewish heritage are associated with increased risk of pancreatic cancer.
- Host etiologic factors associated with increased risk of pancreatic cancer include history of diabetes mellitus, chronic cirrhosis and pancreatitis, a high fat or cholesterol diet, and prior cholecystectomy^a.

Familial Pancreatic Cancer

- **Predisposing Conditions:** Hereditary pancreatitis, HNPCC, Hereditary Breast Cancer associated with the BRCA2 mutation, Ataxia Telangiectasia, FAMMM, and Peutz-Jegher's syndrome. (H3-AFP)^a
- **BRCA-2 mutation** is the MC germline mutation in patients with hereditary pancreatic cancer^a
- **K-ras** is the MC somatic mutation in patients with carcinoma pancreas^a
- **Peutz-Jegher's syndrome** carries the highest relative risk of pancreatic cancer^a
- Patients with pancreatic cancer with DNA mismatch repair mutations have a better prognosis
- **K-ras mutations** and **HER2/neu over expression** are the earliest changes to occur

113. Ans. a. Acute pancreatitis (Ref: Sabiston 19/e p1535-1536; Schwartz 9/e p1219-1220; Bailey 26/e p1137, 25/e p1149; Blumgart 5/e p912-918; Shackelford 7/e p1188)

Risk Factors for Pancreatic Carcinoma	
Established	<ul style="list-style-type: none"> • Tobacco^a • Inherited susceptibility^a
Associated	<ul style="list-style-type: none"> • Chronic pancreatitis^a • Diabetes mellitus type 2^a • Obesity^a
Possible	<ul style="list-style-type: none"> • Physical inactivity^a • Certain pesticides • High carbohydrate/sugar intake

114. Ans. a. K-ras (Ref: Sabiston 19/e p1537; Schwartz 9/e p1220; Bailey 26/e p1137, 25/e p1149; Blumgart 5/e p884; Shackelford 7/e p1188)

Genetic Mutation in Pancreatic Cancer (KRAP-16: K-ras >p16)	
Gene	Pancreatic Cancer %
p16 ^a	82
k-ras ^a	95-100 (MC)
p53 ^a	75
DPC4	55
BRCA2	7

115. Ans. d. Cronkhite-Canada syndrome

Predisposing Conditions for Familial Pancreatic Cancer (H-AFP)	
<ul style="list-style-type: none"> • Hereditary pancreatitis^Q • HNPCC^Q • Hereditary Breast Cancer associated with the BRCA2 mutation^Q 	<ul style="list-style-type: none"> • Ataxia Telangiectasia^Q • FAMMM (Familial atypical multiple mole melanoma) syndrome^Q • Peutz-Jegher's syndrome^Q

116. Ans. d. FAP

117. Ans. b. K-ras

118. Ans. d. History of partial gastrectomy

119. Ans. a. Urgent weight reduction, b. Strict vegetarian diet, c. Stop alcohol, e. Stop cigarette smoking

120. Ans. c. BRCA activated

121. Ans. a. K-ras

122. Ans. d. Ataxia-Telangiectasia

Autosomal Dominant	Autosomal Recessive	X-Linked Disorders
<ul style="list-style-type: none"> – Familial hypercholesterolemia – HNPCC – FAP^Q – BRCA1 and BRCA2 breast cancer – Hereditary hemorrhagic telangiectasia – Marfan's syndrome^Q – Hereditary spherocytosis^Q – Adult polycystic kidney disease – Huntington's chorea^Q – Acute intermittent porphyria^Q – Osteogenesis imperfecta^Q – von Willebrand's disease^Q – Myotonic dystrophy^Q – Familial hypertrophic cardiomyopathy – Neurofibromatosis^Q – Tuberous sclerosis^Q – Otospongiosis^Q – Achondroplasia^Q 	<ul style="list-style-type: none"> – Deafness – Albinism^Q – Wilson's disease^Q – Hemochromatosis^Q – Sickle cell anemia^Q – beta thalassemia^Q – Cystic fibrosis^Q – Hereditary emphysema (α₁ antitrypsin deficiency) – Homocystinuria^Q – Friedrich's ataxia^Q – Phenylketonuria^Q – Fanconi's Syndrome – Gaucher's Disease 	<ul style="list-style-type: none"> – Hemophilia A^Q (recessive) – G6PD deficiency^Q (recessive) – Duchenne/Becker muscular dystrophy^Q (recessive) – Fabry's disease – Ocular albinism – Testicular feminization – Chronic granulomatous disease – Hypophosphatemic rickets^Q (dominant) – Fragile-X syndrome^Q (recessive) – Color blindness^Q

CA PANCREAS CLINICAL FEATURES AND DIAGNOSIS

123. Ans. c. Jaundice (Ref: Sabiston 19/e p1535-1544; Schwartz 10/e p 1394, 9/e p1220-1225; Bailey 26/e p1137, 25/e p1149-1152; Blumgart 5/e p919-925; Shackelford 7/e p1190-1196)

CARCINOMA PANCREAS

- MC type is pancreatic ductal adenocarcinoma (PDAC)^Q
- More common in Men, African Americans, mean age at diagnosis is 72 years^Q
- Overall, <5% of individuals will survive 5 years beyond their diagnosis.
 - Association between risk of pancreatic cancer, H. pylori colonization, and ABO blood groups
 - Established risk factors: Smoking (Tobacco) and Inherited susceptibility^Q
- Hereditary risk factors: Hereditary pancreatitis, HNPCC, Hereditary Breast Cancer associated with the BRCA2 mutation, Ataxia Telangiectasia, FAMMM, and Peutz-Jegher's syndrome. (H3-AFP)^Q
 - K-RAS2 oncogene is activated (by point mutation) in >95% of pancreatic cancers (MC gene mutation)^Q

Pathology

- Macroscopically, ductal adenocarcinoma is a scirrhous (scar forming)^Q type of carcinoma
- It is associated with abundant desmoplastic stroma^Q, in which the neoplastic glands are widely scattered^Q
- MC type is pancreatic ductal adenocarcinoma (PDAC)^Q
- More common in Men, African Americans, mean age at diagnosis is 72 years^Q
- Overall, <5% of individuals will survive 5 years beyond their diagnosis.
 - Association between risk of pancreatic cancer, H. pylori colonization, and ABO blood groups
 - Established risk factors: Smoking (Tobacco) and Inherited susceptibility^Q
- Hereditary risk factors: Hereditary pancreatitis, HNPCC, Hereditary Breast Cancer associated with the BRCA2 mutation, Ataxia Telangiectasia, FAMMM, and Peutz-Jegher's syndrome. (H3-AFP)^Q

- **K-RAS2** oncogene is **activated** (by point mutation) in **>95%** of pancreatic cancers (**MC gene mutation**)^Q

Pathology

- Macroscopically, ductal adenocarcinoma is a **scirrhous** (scar forming)^Q type of carcinoma
- It is associated with **abundant desmoplastic stroma**^Q, in which the **neoplastic glands** are **widely scattered**^Q

Clinical Features

- **MC symptom** for patients with PDACs in the periampullary region is **jaundice**^Q.
- **Pain** typically arising in the epigastrium and radiating to the back.
- **Weight loss** affecting more than 50% of individuals.
- For tumors of the **body** and **tail** of the pancreas, **pain** and **weight loss** become more common at presentation.
- A **palpable distended gallbladder** in **1/3rd** of patients with periampullary PDAC (**Courvoisier Law**)^Q
- With widespread disease, a left supraclavicular node (**Virchow's node**)^Q may be palpable. Periumbilical lymphadenopathy may be palpable (**Sister Mary Joseph's node**)^Q.
- In cases of **peritoneal dissemination**, perirectal tumor involvement may be palpable via digital rectal examination, referred to as **Blumer's shelf**^Q.

Presenting Symptoms of Periampullary Tumors	
Jaundice (75%) ^Q	Pruritus (11%)
Weight loss (51%) ^Q	Fever (3%)
Abdominal pain (39%)	Gastrointestinal bleeding (1%)
Nausea/vomiting (13%)	

Diagnosis

- Tumor markers: **CA19-9** (**most sensitive**)^Q and **CEA**.

- Individuals with **blood Lewis antigen-negative status** (**10-15%**) do **not** develop **elevation** of the **CA19-9**

- **MDCT** is **investigation of choice** for the evaluation of **lesions arising** in the **pancreas**^Q.
- For suspected periampullary pathology, a **three-phase** (**noncontrast**, **arterial**, and **portal venous**) CT scan with 3-mm slices and coronal and three-dimensional reconstruction should be routine.

- **ERCP**: Reserved for cases requiring **therapeutic** or **palliative intervention**^Q
- **Double duct sign** on ERCP is highly suggestive of **pancreatic head cancer**^Q

- **EUS**: For identifying lesions **<2 cm**^Q that do not appear on CT scans
- **Tissue diagnosis** is **not necessary** prior to routine **resection**^Q.
- A suspicious lesion by imaging should be treated with resection.

Treatment

- **Surgical resection** remains the **only potentially curative treatment** of pancreas cancer.

Tumors of head of the pancreas	Pylorus preserving pancreaticoduodenectomy or Longmire-Traverso procedure is preferred ^Q
Tumors of body and tail of the pancreas	Distal pancreatectomy and en-bloc splenectomy ^Q

- MC complication of pancreaticoduodenectomy is delayed gastric emptying^Q
- MC **cause of death** following **pancreaticoduodenectomy** is **cardiopulmonary complications**^Q.
- **Most important predictor** of **post-operative survival** is **R0 resection**.
- **Most important margin** in **pancreaticoduodenectomy** is **retroperitoneal** or **uncinate margin**^Q.

Palliative Therapy for Pancreatic Cancer	
Biliary obstruction	<ul style="list-style-type: none"> • ERCP with metal stent placement (Best)^Q • Roux-en-Y hepaticojejunostomy
Gastric outlet obstruction	<ul style="list-style-type: none"> • Endoscopic stenting (Preferred)^Q • Double bypass (Roux-en-Y hepaticojejunostomy + gastrojejunostomy)
Pain	<ul style="list-style-type: none"> • NSAIDs or opiates^Q • Celiac nerve block^Q

Chemotherapy

- **Gemcitabine**^Q is currently the standard of care for patients with **metastatic pancreatic cancer**.

Prognosis

- **Five year survival** after **curative resection** (pancreaticoduodenectomy) approaches **15-20%**^Q
- Overall, 5 year survival rate **with pancreatic cancer** is **5%**^Q.

Median survival in Carcinoma Pancreas	
Resectable disease (stage I and II)	15-20 months ^a
Locally advanced disease (stage III)	6-10 months ^a
Metastatic disease (stage IV)	3-6 months ^a

- But in specific patients a **tissue diagnosis** may be **needed** such as in **patients entering a clinical trial**, **prior to neoadjuvant chemotherapy**, and **prior to chemotherapy in advanced tumors**. In these patients, an EUS is highly accurate.

Indications for Staging Laparoscopy (Routine use of laparoscopy is not warranted)	
1. Tumor >3 cm in diameter ^a	3. Equivocal findings of metastasis on CT ^a
2. Body or tail tumors ^a	4. CA19-9 levels >100 U/mL ^a

7 th AJCC TNM Classification of Pancreatic Cancer	
Tis	Carcinoma in situ (also PanIN 3)
T1	Tumor limited to pancreas upto 2 cm in greatest dimension
T2	Tumor limited to pancreas >2 cm in greatest dimension
T3	Tumor extends beyond the pancreas , but without involvement of the celiac axis or the superior mesenteric artery
T4	Tumor involves the celiac axis or the superior mesenteric artery (unresectable primary tumor)
N1	Regional LN metastasis
M1	Distant metastasis

7 th AJCC TNM Staging of Pancreatic Cancer	
Stage 0	Tis N0 M0
Stage IA	T1 N0 M0
Stage IB	T2 N0 M0
Stage IIA	T3 N0 M0
Stage IIB	T1-T3 N1 M0
Stage III	T4 AnyN M0
Stage IV	Any T AnyN M1

124. Ans. a. MDCT

- Diagnostic investigation in carcinoma pancreas is MDCT^a
- MDCT is **investigation of choice** for the evaluation of **lesions arising in the pancreas**^a
- IOC for diagnosis, staging and follow-up in CA pancreas: MDCT^a

125. Ans. a. Most common site is body and tail

126. Ans. c. Pancreatic carcinoma (Ref: Grainger 4/e p1356-64)

127. Ans. a. Periampullary carcinoma

128. Ans. a. Pancreatic cancer, c. Stomach cancer (Ref: Robbins 7/e p334-335)

Malignancies associated with Migratory Thrombophlebitis	
• CA pancreas (MC) ^a	• Prostate cancer ^a
• CA lung ^a	• Ovarian cancer ^a
• GI malignancies ^a	• Lymphoma ^a

- Trousseau's syndrome: Migratory thrombophlebitis^a
- Trousseau's sign: Carpopedal spasm in hypocalcemia^a
- Troisier's sign: Palpable left supraclavicular LN (Virchow's node)^a

129. Ans. a. Head

130. Ans. b. CA head of pancreas causes obstruction of both pancreatic and biliary duct, c. Smoking predisposes

131. Ans. a. Head is the most common site, c. Obstruction of bile and pancreatic secretion is common

132. Ans. a. Hypotonic duodenogram, c. USG, d. Endoscopy, e. CT Scan

133. Ans. d. Periampullary carcinoma

134. Ans. c. CA head of pancreas

135. Ans. d. Ductal adenocarcinoma

136. Ans. a. Ductal adenocarcinoma

137. Ans. d. CT scan (Ref: CSDT 11/e p645; Schwartz 9/e p1220-1225)

- Investigation of choice for carcinoma pancreas: MDCT^Q
- Currently CT is probably the single most versatile and cost effective tool for diagnosis of pancreatic cancer

138. Ans. b. Syndrome of inappropriate secretion of ADH (Ref: Harrison 18/e p2908)

Causes of Syndrome of Inappropriate Antidiuresis (SIADH)		
Neoplasms	Infections	Neurologic
<ul style="list-style-type: none">• Lung^Q• Duodenum^Q, Pancreas^Q• Ovary^Q, Bladder^Q, ureter^Q• Thymoma^Q, Mesothelioma^Q• Bronchial adenoma^Q• Carcinoid• Gangliocytoma, Ewing's sarcoma	<ul style="list-style-type: none">• Pneumonia^Q, bacterial or viral• Abscess^Q, lung or brain• Cavitation (aspergillosis)• Tuberculosis, lung or brain• Meningitis, bacterial or viral• Encephalitis^Q, AIDS^Q	<ul style="list-style-type: none">• Guillain-Barré syndrome^Q• Multiple sclerosis^Q• Delirium tremens^Q• Amyotrophic lateral sclerosis^Q• Hydrocephalus, Psychosis• Peripheral neuropathy^Q
Metabolic	Vascular	Drugs
<ul style="list-style-type: none">• Acute intermittent porphyria	<ul style="list-style-type: none">• Cerebrovascular occlusions, hemorrhage• Cavernous sinus thrombosis^Q	<ul style="list-style-type: none">• Vasopressin^Q or desmopressin• Chlorpropamide^Q• Oxytocin, high dose^Q• Vincristine, Carbamazepine^Q• Nicotine, Phenothiazines^Q• Cyclophosphamide^Q• Tricyclic antidepressants^Q• Monoamine oxidase inhibitors^Q• Serotonin reuptake inhibitors^Q
Pulmonary		
<ul style="list-style-type: none">• Asthma, Pneumothorax^Q• Positive-pressure respiration	Congenital malformations	
Head trauma	<ul style="list-style-type: none">• Agenesis corpus callosum• Cleft lip/palate^Q• Other midline defects	
<ul style="list-style-type: none">• Closed and penetrating^Q		

139. Ans. b. Carcinoma head of pancreas

140. Ans. c. CA head of pancreas

141. Ans. a. Head

142. Ans. b. Periampullary carcinoma (Ref: Sabiston 19th/1535-1544; Schwartz 9th/1220-1225; Bailey 26th/1138, 25th/1149-1152; Blumgart 5th/919-925; Shackelford 7th/1190-1196)

- "The waxing and waning nature of jaundice is due to sloughing of ampullary cancer, resulting in transient resolution of the jaundice."

CARCINOMA PANCREAS: TREATMENT AND PROGNOSIS

143. Ans. a. R0 resection (Ref: Sabiston 19/e p1541; Schwartz 10/e p1394, 9/e p1225-1226; Bailey 25/e p1150-1152; Blumgart 5/e p819-825; Shackelford 7/e p1192-1202)

144. Ans. a. Lung (Ref: Sabiston 19/e p1541; Blumgart 5/e p930-933)

Metastatic Tumors to Pancreas
<ul style="list-style-type: none"> • MC site of primary: RCC^Q > Malignant melanoma • On autopsy, MC site of primary: CA lung^Q

145. Ans. a. Delayed gastric emptying (Ref: Sabiston 19/e p1541; Schwartz 9/e p1125-1126; Blumgart 5/e p819-825; Shackelford 7/e p1200)

Morbidity Following Pancreaticoduodenectomy	
• Delayed gastric emptying (18%) ^Q	• Cardiac events (3%)
• Pancreas fistula (12%)	• Bile leak (2%)
• Wound infection (7%)	• Overall reoperation (3%)
• Intra-abdominal abscess (6%)	

146. Ans. b. Pain is early in the course of the disease (Ref: Sabiston 19/e p1537)

Carcinoma Pancreas
<ul style="list-style-type: none"> • Symptoms include unexplained episodes of pancreatitis^Q, painless jaundice, nausea, vomiting, steatorrhea, and unexplained weight loss • With further spread beyond the pancreas, these patients may note upper abdominal or back pain when peripancreatic nerve plexuses are involved and ascites when peritoneal carcinomatosis or portal vein occlusion develops^Q

147. Ans. c. Gemcitabine (Ref: Bailey 26/e p1141; Blumgart 5/e p925; Shackelford 7/e p1202)

- Gemcitabine^Q is currently the standard of care for patients with metastatic pancreatic cancer.

148. Ans. b. Tumors of head pancreas (Ref: Blumgart 5/e p959-960)

MIDDLE OR CENTRAL OR SEGMENTAL PANCREATECTOMY

- Middle pancreatectomy is a **safe, effective procedure** for treatment of **benign and low grade malignant neoplasms** of the **mid pancreas**^Q

Advantages of Middle or Segmental Pancreatectomy

- **Preserves pancreatic parenchyma**
- **Reduces** the risk of **exocrine and endocrine insufficiency**
- Consists of a **limited resection** of the **mid portion** of the pancreas
- Can be performed in selected patients affected by tumors of the **pancreatic neck**^Q
- In experienced hands it is associated with **no mortality** but with **high morbidity**, even if the rate of “clinical” pancreatic fistula is about 20%
- Middle pancreatectomy is **avoided** in patients affected by **main duct IPMN**.

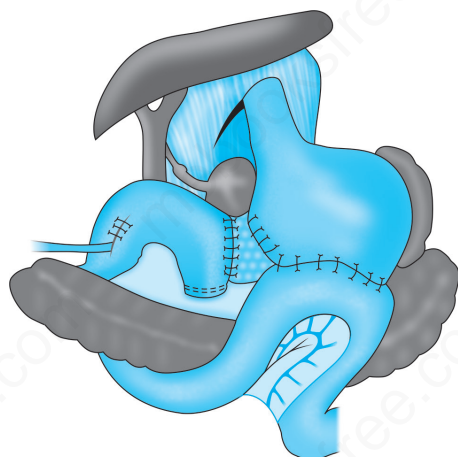
Indications of Middle or Segmental Pancreatectomy

- **Benign or low grade malignant tumor** (Neuroendocrine tumors, serous cystadenoma, branch duct IPMNs)^Q
- Location in the **neck**^Q or its contiguous portion
- A **distal pancreas stump** of at least **5cm** in length^Q

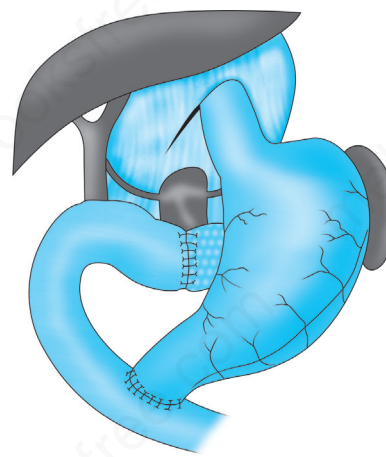
149. Ans. c. Median survival in locally advanced (stage III) disease is 3-6 months (Ref: Sabiston 19/e p1541; Blumgart 5/e p922; Shackelford 7/e p1195-1196)

150. Ans. b. Duodenojejunostomy (Ref: Sabiston 19/e p1539; Bailey 26/e p1139-1140, 25/e p1150-1151; Shackelford 7/e p1196)

- Duodenojejunostomy is done in **PPPD**, not in Whipple's procedure.
- Gastrojejunostomy is done in **Whipple's procedure**.



Whipple's procedure



Longmire-Traverso procedure

WHIPPLE'S PROCEDURE (PANCREATODUODENECTOMY)

- It consists of complete **removal of the pancreatic and hepatoduodenal ligament lymph nodes**, the **duodenum** with a **short segment of the proximal jejunum** and the **distal half to two-thirds of the stomach** with the **right half of the greater omentum**.

Whipple's Procedure involves resection of

- | | |
|---------------------------------|---------------------------------|
| • Distal stomach ^Q | • Duodenum ^Q |
| • Gall bladder ^Q | • Proximal jejunum ^Q |
| • CBD ^Q | • Regional lymphatics |
| • Head of pancreas ^Q | |

Restoration of GI continuity requires

- | |
|--|
| • Pancreaticojejunostomy ^Q |
| • Hepaticojejunostomy ^Q |
| • Gastrojejunostomy ^Q |

- **Pylorus Preserving Pancreaticoduodenectomy (PPPD) or Longmire-Traverso Procedure** is the preferred surgery for carcinoma head of pancreas^Q.
- The **Whipple procedure** is now reserved for situations in which the entire duodenum has to be removed (e.g. in FAP) or where the tumour encroaches on the 1st part of the duodenum or the distal stomach and a PPPD would not achieve a clear resection margin^Q.

Pylorus Preserving Pancreaticoduodenectomy or Longmire Traverso Procedure

- To retain a functioning pylorus, the entire stomach and 2cm of the first part of duodenum and their neurovascular supply are preserved^Q.
- **Pylorus Preserving Pancreaticoduodenectomy (PPPD) or Longmire-Traverso Procedure** is the preferred surgery for carcinoma head of pancreas^Q.

151. Ans. c. Portal vein

152. Ans. d. Choledochojejunostomy (Ref: Devita 9/e p979)

PALLIATIVE SURGERY IN ADVANCED, NON-RESECTABLE PANCREATIC ADENOCARCINOMA

- Surgery for advanced, non-resectable pancreatic adenocarcinoma can palliate obstruction of CBD or duodenum, as well as control visceral pain^Q
- Hepaticojejunostomy, choledochojejunostomy or choledochoduodenostomy offers durable drainage of an obstructed bile duct^Q
- Cholecystojejunostomy is less reliable but can be employed when tumor bulk precludes common duct procedure
- Gastrojejunostomy (antecolic anastomosis) palliates gastric outlet obstruction^Q
- Antecolic anastomosis^Q is done to avoid complications from an expanding lesser sac tumor

153. Ans. d. Ampullary (Ref: Shackelford 7/e p1187-1206)

Periampullary Carcinoma

1. Adenocarcinoma of head of the pancreas (40-60%)^Q
2. Adenocarcinoma of ampulla of Vater (10-20%)
3. Distal bile duct adenocarcinoma (10%)
4. Duodenal adenocarcinoma (5-10%)

- Patients with pancreas adenocarcinoma involving the body or tail of the gland are more likely to have weight loss and abdominal pain as their initial complaints.
- These lesions can grow to a larger size before producing symptoms and are often diagnosed at a later stage with a poorer prognosis.
- Most body and tail cancers have already metastasized to distant sites or extended locally to involve nodes, nerves, or major vessels by the time of diagnosis.
- **Best prognosis: Duodenal adenocarcinoma > Ampullary carcinoma > Distal Bile duct adenocarcinoma > Head of pancreas > Body and tail of Pancreas (DAD Head Body and Tail)**^Q

154. Ans. a. Disruption of pancreatic anastomosis

155. Ans. c. Pancreaticoduodenectomy

156. Ans. b. Mobilization of 2nd part of duodenum

- **Kocher maneuver** is a technique for mobilization of the duodenum^Q.

157. Ans. b. Pancreatic carcinoma

158. Ans. c. CA pancreas

GI Malignancy	Chemotherapy
• CA Esophagus	ECF (Epirubicin + Cisplatin + 5-FU) ^Q
• CA Stomach	ECF (Epirubicin + Cisplatin + 5-FU) ^Q
• CA Pancreas	Gemcitabine ^Q
• NET of pancreas	Streptozocin + 5-FU ^Q
• Cholangiocarcinoma	Gemcitabine + Cisplatin ^Q
• CA GB	Gemcitabine + Cisplatin ^Q
• Small intestine adenocarcinoma	5-FU ^Q
• Colorectal carcinoma	FOLFOX-IV (5-FU + Leucovorin + Oxaliplatin) ^Q
• CA anal canal	Nigro Regimen: Chemoradiation (5-FU + Mitomycin C + Radiation) ^Q

159. Ans. c. Good prognosis

160. Ans. d. Acute pancreatitis never occurs in CA pancreas (Ref: Sabiston 19/e p1537)

CLINICAL FEATURES OF CARCINOMA PANCREAS

- MC site is head and uncinate process^Q
- Patients with lesions that occur near the bile duct, such as those near the ampulla, head of the pancreas, and uncinate process, are much more likely to have obstructive jaundice^Q.
- Those with lesions in the body or tail of the pancreas are more likely to complain of pain.
- Pain suggests unresectability^Q in carcinoma pancreas
- Two third (65%) patients present with diabetes in carcinoma pancreas^Q
- Patients may also have acute pancreatitis secondary to obstruction of the pancreatic duct^Q.
- Elderly patients with acute pancreatitis but without a history of alcohol use or gallbladder stones should be screened for a neoplasm^Q.

161. Ans. a. CA 19-9

162. Ans. b. CA duodenum (Ref: Shackelford 7/e p1201)

- Best prognosis: Duodenal adenocarcinoma > Ampullary carcinoma > Distal Bile duct adenocarcinoma > Head of pancreas > Body and tail of Pancreas (DAD Head Body and Tail)

163. Ans. a. Retroperitoneal margin (Ref: Shackelford 7/e p1196-1200)

164. Ans. c. Cardiopulmonary complications

165. Ans. d. Distal pancreatectomy with splenectomy (Ref: Sabiston 19/e p1540; Schwartz 9/e p1226; Bailey 26/e p1139; Shackelford 7/e p1198-199)

RESECTIONAL SURGERY FOR PANCREATIC BODY AND TAIL TUMORS

- Most body and tail cancers have already metastasized to distant sites or extended locally to involve nodes, nerves, or major vessels by the time of diagnosis.
- Splenic vein involvement or occlusion is not a sign of nonresectability^Q.
- Involvement of the splenic and SMV confluence generally precludes resection.
- Resection involves a distal pancreatectomy either with or without concomitant splenectomy^Q.
- Splenectomy is usually performed with distal pancreatectomy in patients suspected of having carcinoma to obtain better margins, to remove the lymph nodes at the tip of the pancreas and the hilum of the spleen, and to avoid tedious dissection of the splenic artery and vein.

166. Ans. b. Ascites

PSEUDOPAPILLARY TUMOR

167. Ans. c. These are small tumors (Ref: Schwartz 9/e p1236; Blumgart 5/e p908-909; Shackelford 7/e p1268)

SOLID PSEUDOPAPILLARY TUMOR (PAPILLARY CYSTIC CANCER OR FRANTZ TUMOR)

- Approximately 90% of solid pseudopapillary tumor harbor APC/beta-catenin mutation^Q.
- Typically occur in women in the second or third decade^Q of life
- Regarded as low grade malignant potential^Q tumor.

Pathology

- Lesions may be large, encapsulated, evenly distributed^Q throughout the pancreas.
- Strongly positive for beta-catenin, progesterone receptors, vimentin, CD-10 and CD-56^Q.
- It can mimic the histologic appearance of NET but lacks the nuclear features of NET and lacks the neuroendocrine markers such as chromogranin and synaptophysin.

Clinical Features

- Non-specific signs and symptoms related to size of the tumor at the time of presentation
- Typically occur in women in the second or third decade^Q of life

Diagnosis

- CT scan: Hypodense areas representing hemorrhage or necrosis
- Diagnosis is based on presence of typical histological characteristics such as foamy macrophages, cholesterol clefts, nuclear grooves, and aggregate of hyaline globules^Q.

Treatment

- Complete resection is associated with long-term survival^Q even in presence of metastatic disease.
- Incomplete removal result in local recurrence.

168. Ans. d. Chromogranin is positive

INSULINOMA

169. Ans. a. EUS with intra-operative palpation (Ref: Sabiston 19/e p951, 956, 957; Schwartz 10/e p1391, 9/e p1217; Bailey 26/e p787-789, 25/e p817-818; Blumgart 5/e p935-937; Shackelford 7/e p1206-1210)

LOCALIZATION OF INSULINOMA

- A small portion of insulinomas remain unlocalizable despite extensive studies and are therefore considered occult.
- When the **diagnosis is certain** based on the result of a **72-hour fast**, **surgical exploration** with careful inspection, **palpation**, and **intraoperative ultrasound (IOUS)** is indicated^Q.
- Studies have shown that the **combination of surgical exploration** with **IOUS** identifies almost all insulinomas^Q.

Insulinoma

- Insulinoma is **MC functioning tumor** of the **endocrine pancreas**^Q
- The average age at diagnosis is 45 years.

Location of Insulinoma

- 97% in **pancreas** (equal distribution in the head, body, and tail)^Q
- 3% in **duodenum**, **splenic hilum**, or **gastrocolic ligament**^Q

- Typically small, with an average size of 1.0 to 1.5 cm.
- Diagnostic hallmark is **Whipple's triad**: Symptoms of hypoglycemia + **Low blood glucose** levels (40-50 mg/dL) + **Relief of symptoms** after the administration of glucose^Q.

Clinical Features

- Diagnostic hallmark is **Whipple's triad**^Q: Fasting-induced **neuroglycopenic symptoms** of hypoglycemia (diaphoresis, shaking, mental confusion, obtundation, and seizures), **low blood glucose** levels (40 to 50 mg/dL), and **relief of symptoms** after the administration of glucose.
- **Sympathetic overactivity**^Q in response to hypoglycemia: Fatigue, weakness, fearfulness, hunger, tremor, diaphoresis, and tachycardia.
- **CNS disturbance**: Apathy, irritability, anxiety, confusion, excitement, loss of orientation, blurred vision, delirium, stupor, coma, and/or seizures.
- **Significant weight gain**: Patients eat frequently to prevent hypoglycemia.
- It is a **painless condition**.

Diagnosis

- **Gold standard test** for the **diagnosis** of insulinoma is the **72-hour fasting**^Q test
- An **insulin-to-glucose** ratio > 0.4 is consistent with insulinoma^Q

- Provocative testing with **tolbutamide**, **glucagon**; or **intravenous calcium** is rarely required.
- **CECT** or **MRI**: **Hyperattenuating** as compared with surrounding pancreatic tissue because of **rich vascular supply**^Q

Localization

- **Angiography** will detect approximately 70% of **insulinomas** >5 mm, showing a characteristic **vascular blush**^Q

- **Portal venous sampling** for insulin with or without **arterial stimulation** with **calcium** is the **best pre-operative method** of **localization**^Q
- **EUS** with **intra-operative palpation** is **best localization technique** for **Insulinoma**^Q

Treatment

- **Diazoxide** decreases beta cell release of insulin, used to prevent or attenuate symptoms of hypoglycemia prior to surgical intervention once the diagnosis is made^Q.
- Insulinomas are well suited for **laparoscopic resection** or **enucleations**^Q.

Insulinoma of head of pancreas	• Enucleation is TOC ^Q
Insulinoma of body or tail of pancreas	• Distal pancreatectomy is TOC ^Q

- **Streptozotocin**, with or without **5-fluorouracil**, is associated with **improved survival** in **metastatic pancreatic endocrine tumors**^Q.

170. Ans. d. Selective arteriography

- **Portal venous sampling** for insulin with or without **arterial stimulation** with **calcium** is the **best pre-operative method** of **localization**^Q.
- **EUS** with **intra-operative palpation** is **best localization technique** for **Insulinoma**^Q.

171. Ans. a. Insulinoma

172. Ans. a. Usually asymptomatic and need no treatment

173. Ans. c. Weight loss is important feature

174. Ans. a. 72-hours fasting test

175. Ans. b. Xylose test

176. Ans. a. Intra-operative USG

177. Ans. b. Enucleation

178. Ans. a. Insulinoma

NET OF PANCREAS

- MC NET of Pancreas: **Non-functional** (Mostly malignant) > **Insulinoma**^Q
- MC benign NET of Pancreas: **Insulinoma**^Q
- MC malignant functional NET of Pancreas: **Gastrinoma**^Q

179. Ans. d. Equally distributed

180. Ans. a. Insulinoma

181. Ans. d. Arteriography

182. Ans. b. Weight loss

ZOLLINGER-ELLISON SYNDROME

183. Ans. a. Duodenum (Ref: Sabiston 19/e p951, 956, 958; Schwartz 10/e p1071-1073, 9/e p1218; Bailey 26/e p789-790, 25/e p818-819; Blumgart 5/e p937-941; Shackelford 7/e p749-756)

ZOLLINGER-ELLISON SYNDROME

- Gastrinoma is MC **functioning malignant**^Q pancreatic endocrine tumor.
- **More common in men**, mean age **50 years**^Q
- ZES occur in **two forms**: **Sporadic** (75%) and **MEN-1** association (25%)^Q
- Those associated with **MEN-1** are almost always **multiple, early onset**, more common in **duodenum**^Q

- MC site of Gastrinoma: **Duodenum** > **Pancreas**^Q
- **Duodenal primary** tends to spread to **local lymph nodes**^Q
- **Pancreatic primary** tends to spread to the **liver**

- Presence or absence of **lymph node metastasis** did **not** affect survival^Q.
- All gastrinomas also produce **chromogranin A**^Q

- **Gastrinoma** → increased gastrin secretion → marked gastric acid hypersecretion → **Peptic ulcer**

Location

- MC site is **duodenum** (50-70%) followed by **Pancreas** (20-40%)^Q
- In **Duodenum**, MC in **1st part**^Q (71%) > 2nd part (21%) > 3rd part (8%)
- About 70-90% of gastrinomas are located **within the Passaro's triangle**^Q.

Boundaries of Passaro's Triangle

- **Junction** of the cystic and CBD^Q
- **Junction** of 2nd and 3rd part of duodenum^Q
- **Junction** of neck and body of pancreas

Clinical Features

- The gastric acid hypersecretion causes **peptic ulcer** disease often **refractory** and **severe diarrhea**
- MC **presenting symptoms** are **abdominal pain**^Q (70-100%), **diarrhea** (50-70%) and **GERD** (30-35%).
- **Causes of Diarrhea**: Inability of the intestinal tract to absorb the **large volumes** of **fluid** secreted by the **stomach**, **acid-induced injury** to the mucosa of the upper **small intestine**, precipitation of bile salts, inactivation of pancreatic lipase by low pH

- **Unique characteristic** of acid-induced diarrhea: **Halted by nasogastric aspiration** of gastric secretions^Q

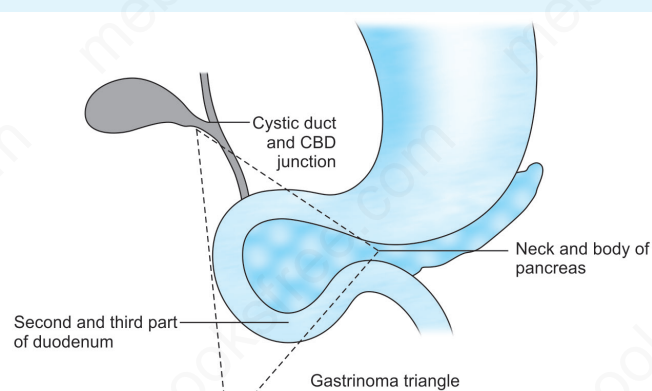
- Most patients have peptic ulcers (MC are **duodenal ulcers**)^Q
- ZES must be excluded in all patients with intractable peptic ulcers, severe esophagitis, or persistent secretory diarrhea.
- MC cause of death in ZES: **Liver metastasis**^Q

Diagnosis

- **Hypergastrinemia** with **increased secretion of gastric acid** confirms the diagnosis
- Elevated gastrin alone is not sufficient to diagnose ZES (**Basal gastric acid hypersecretion** must be demonstrated).

Zollinger-Ellison Syndrome

- 100% patients will have a fasting serum gastrin level >100 pg/mL
- **BAO >15 meq/hr** in most patients and **>5 mEq/hr** in patients with **prior surgery** to decrease gastric acid secretion
- Levels **>1000 pg/mL** are **diagnostic**^Q



- **Elevated serum gastrin level** with a **pH <2** in the gastric aspirate is **almost diagnostic** of ZES^Q.

Provocative Test in Gastrinoma

- If the **diagnosis is in doubt**, the **provocative tests** are highly useful.
- Provocative diagnostic tests for ZES:
 - **Secretin stimulation test**
 - **Calcium stimulation test**
 - Secretin-plus-calcium stimulation test
 - **Bombesin test**
 - Protein meal test
- **Secretin provocation test is best.**
- **Secretin Provocation Test:** An increase of **>200 pg/mL** in the **gastrin value** after administration of secretin is **diagnostic**^Q

Localization

- Somatostatin receptor scintigraphy (SRS) is **imaging test of choice** for **localizing** both **primary** and **metastatic gastrinomas**^Q.
- The radiolabeled somatostatin analogue has a high affinity for the **type 2 somatostatin receptor**, which is **expressed in most gastrinomas**.

Treatment

- **Acid secretion** is controlled by **PPIs**^Q
- Pharmacologic control of acid secretion with PPIs has rendered **total gastrectomy** and other surgical acid-reducing procedures **unnecessary**^Q.

- **ZES in MEN-1: Hyperparathyroidism** should be **treated first** because it can complicate the management of their gastrinoma, **neck exploration** should be performed **before resection** of gastrinoma^Q.

- **Distal pancreatectomy:** Gastrinoma involving **body** or **tail**^Q of pancreas
- **Pancreaticoduodenectomy:** Gastrinoma involving **head**^Q of pancreas

Prognosis

- **Best predictor** of survival for patients with gastrinoma is the **presence of liver metastases**^Q
- **LN metastases** are **not predictive**^Q.
- More than 50% of patients with gastrinomas have metastatic disease at the time of diagnosis.
- **Resection** of all **gross disease** and **metastases** may provide **palliation** of symptoms and may **prolong survival**^Q.

184. Ans. c. Decreased BAO and MAO

- Basal acid output is increased in Gastrinoma^Q.

185. Ans. d. SRS

187. Ans. d. 4th part of duodenum

189. Ans. a. 50% are associated with adrenal malignancy

191. Ans. d. H₂ receptor antagonist

193. Ans. b. Junction of 3rd and 4th part of duodenum

195. Ans. a. Located mostly in pancreas, c. 90% benign

197. Ans. d. Serum gastrin value of 200 pg/ml with secretin stimulation

198. Ans. d. Massive HCL in response to histamine injection

199. Ans. a. Gastrin levels >1000 pg/mL, b. BAO (Basal acid output) >15 meq/hr, c. Somatostatin is inhibitor of HCL secretion, d. Omeprazole is helpful, e. Secretin increases gastrin secretion in Zollinger-Ellison syndrome

200. Ans. a. MC site is duodenal loop, c. It is an endocrine disease, d. Surgical excision is done, e. Surgical excision is done

201. Ans. b. Exocrine tumor

202. Ans. b. Reduced BAO: MAO ratio

203. Ans. b. Zollinger-Ellison syndrome

204. Ans. c. Zollinger-Ellison syndrome

186. Ans. c. Most common site is pancreas

188. Ans. c. Decreased BAO/MAO

190. Ans. c. Beta cell tumors of the pancreas

192. Ans. a. Endoscopic ultrasound

194. Ans. a. Duodenum

196. Ans. b. Exocrine tumor

ENDOCRINE TUMORS OF PANCREAS

205. Ans. a. SRS (Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1393, 9/e p1219; Bailey 26/e p788, 25/e p816; Blumgart 5/e p940-941; Shackelford 7/e p1211-1212)

GLUCAGONOMA (HYPERGLYCEMIC CUTANEOUS SYNDROME)

- Compared with other pancreatic NET, they tend to be **larger**^Q, averaging **5-10 cm**^Q in size at the time of diagnosis.
- More common in **females**; 70% are **malignant**^Q.
- **MC site:** **Body** and **tail**^Q of pancreas.
- Tumors are usually >3 cm in diameter and are **highly vascular (tumor blush)**^Q.
- The **diabetes** is **mild** and **not associated** with diabetic **ketoacidosis** because insulin secretion by beta cell is preserved^Q.

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Clinical Features

- **Classic presentation** of the 4Ds: **Diabetes, dermatitis, DVT, and depression**^Q.

- **Necrolytic erythema migrans** are **MC manifestations** of the disease, seen in 2/3rd of patients^Q.
- **Necrolytic erythema migrans**: The characteristic rash occur in **areas of friction**; rash is **migratory, red, and scaling**, associated with **intense pruritus**^Q

- **Parenteral administration** of **amino acids** was found to result in the **disappearance** of the **skin lesions**^Q
- **Deep vein thrombosis** occurs in 30%^Q of patients.
- Neurologic manifestations include ataxia, dementia, scotomata, and proximal muscle weakness.

Diagnosis

- **Fasting glucagon** level >50 pmol/L is considered **diagnostic**^Q.
- **VIPomas, glucagonomas, and somatostatinomas** are **usually larger** and **easily localized** by CT^Q.
- **SRS** can be performed if **CT is not informative**.

Treatment

- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas, and nonfunctional pancreatic NET** and remains the **only curative option**^Q.
- **Dacarbazine** is **uniquely effective against glucagonoma**^Q as compared with other pancreatic NET and complete remission has been reported in several cases.

206. Ans. a. Insulinoma

207. Ans. d. SRS (Ref: Sabiston 19/e p954, 956, 960)

LOCALIZATION OF NET OF PANCREAS

- **Somatostatin receptors** are present in >90% of **gastrinomas**; in contrast, pancreatic adenocarcinomas do not possess somatostatin receptors. They are **also present** in a significant portion of **glucagonomas** and **nonfunctioning endocrine tumors**^Q.
- The **sensitivity for SRS** is **over 80%** for **all pancreatic NET** excluding **insulinomas**^Q
- **SRS** has an **overall sensitivity** of 80% to 100% and **specificity** >90% for **gastrinomas**^Q.
- **SRS** is also **useful for detecting hepatic metastases** from **noninsulinoma endocrine tumors**

208. Ans. b. Glucagonoma

209. Ans. a. Most PPomas are benign (Ref: Sabiston 19/e p955, 960; Schwartz 9/e p1219; Bailey 26/e p790-791, 25/e p819-820; Blumgart 5/e p942; Shackelford 7/e p1213-1214)

PPOMAS/NON-FUNCTIONING PANCREATIC ENDOCRINE TUMOR

- Approximately 10-25% of all neuroendocrine pancreatic tumors are **nonfunctional**^Q.
- Tumors are **large (>5 cm)** and **almost all (80%)** are **malignant** and **metastatic**;
- Usually **solitary**, mostly in the **head**^Q

Clinical Features

- Plasma elevation of PP is not associated with specific symptom.

Diagnosis

- Elevated plasma levels of **chromogranin A** and **B** are found in 69-100%^Q of patients; **neuron specific enolase** in 31%; **PP** in 50-75%; **alpha-HCG** in 40%; **beta-HCG** in 20%.
- **Atropine Suppression Test**: Atropine (1 mg intramuscularly) **does not suppress** the levels of **plasma PP** with PETs but did suppress the level by 50% or more in all patients without tumors.
- **Adenocarcinoma** can be **distinguished** from NETs by immunohistochemical staining with **chromogranin A**^Q.

Treatment

- Mostly located in the **head** of the pancreas and require a **pancreaticoduodenectomy**.
- **Dopamine agonists** **decrease** circulating levels of **PP** and **chromogranin A** in patients with **large, unresectable** islet cell tumors^Q.

210. Ans. d. Increased acid secretion (Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1392-1393, 9/e p1219; Bailey 26/e p788; Blumgart 5/e p941; Shackelford 7/e p1211)

VIPOMAS (VERNER-MORRISON SYNDROME)

- Also known as WDHA syndrome (watery diarrhea, hypokalemia, achlorhydria) or **pancreatic cholera**^Q
- Usually **solitary**; MC site is **tail of pancreas**^Q
- **Two-thirds** are malignant^Q.

Clinical Features

- **Diagnostic triad:** **Secretory diarrhea + High levels of circulating VIP + Pancreatic tumor**^Q.
- **Profuse, watery, iso-osmotic secretory diarrhea** is MC **presenting symptom** and may exceed a volume of 3 to 5 liters/day.
- The **diarrhea persists despite fasting**, which qualifies it as a secretory diarrhea and, **despite nasogastric aspiration**, which differentiates it from the diarrhea of ZES.

- Characterized by: **Hypokalemia, hypercalcemia, hypochlorhydria and hyperglycemia**^Q.

- The **tetany** has been attributed to **hypomagnesemia** from chronic diarrhea.

Diagnosis

- **Constant features** are **diarrhea, hypovolemia, hypokalemia** and **acidosis**, variable features are **achlorhydria** or **hypochlorhydria**, **hyperglycemia** and **flushing with rash**^Q.
- **VIPomas, glucagonomas, and somatostatinomas** are usually larger and easily localized by CT^Q.

Treatment

- **Aggressive preoperative hydration** and **correction of electrolyte abnormalities** and acid-base disturbances^Q.
- **Octreotide** is commonly used preoperatively to **reduce diarrhea volume** and facilitate fluid and electrolyte replacement.
- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas**, and **nonfunctional pancreatic NET** and remains the **only curative option**^Q.

211. Ans. c. Somatostatinoma (Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1393, 9/e p1219; Bailey 26/e p788; Blumgart 5/e p941-942; Shackelford 7/e p1210-1211)

SOMATOSTATINOMA

- MC site is **head of the pancreas**^Q.
- Most somatostatinomas are **solitary** and located within the **pancreatic head (MC)**^Q or duodenum
- **Equally common** in males and females, of about **50 years**.

Clinical Features

- Somatostatin excess causes **steatorrhea** (30-68%), **mild diabetes** (60%), **cholelithiasis** (70%), and **hypochlorhydria** (86%)^Q.

Diagnosis

- **VIPomas, glucagonomas, and somatostatinomas** are usually larger and easily localized by CT^Q.

Treatment

- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas**, and **nonfunctional pancreatic NET** and remains the **only curative option**^Q.
- In **75% cases**, somatostatinomas are **metastatic** and **>5 cm** at the time of diagnosis.
- **Whipple's procedure** in localized tumor is curative.
- In unresectable disease, **octreotide** and **interferon alfa** may improve symptoms.

212. Ans. a. Glucagonoma

213. Ans. b. Somaststationomas

214. Ans. a. Cyanosis (Ref: Sabiston 19/e p954-955)

NEUROTENSINOMA

- Neurotensinoma cause **hypokalemia**, weight loss, **hypotension**, **cyanosis**, flushing and **diabetes**^Q.
- They are usually **malignant**^Q.

GRFoma

- It occurs **most often** in the **lung (bronchus)**^Q, then pancreas, jejunum, adrenal glands and retroperitoneum.
- Patient presents with **acromegaly** and a **pancreatic mass**^Q.
- **Pancreatic GRFomas** are **large** (>6 cm).
- One third will have metastasized at the time of diagnosis.
- Approximately **50%** of patients with GRFomas also have **ZES** and **33%** have **MEN-1**.

215. Ans. a. SRS

216. Ans. a. Insulinoma is MC, b. VIP cause diarrhea, d. Somatostatinoma cause gall stone formation, e. Gastrinoma has high chance of malignancy

NET of Pancreas	
Tumor	MC site
Gastrinoma	• Duodenum (1 st part) >Pancreas ^Q
Insulinoma	• Equally distributed ^Q in head, body and tail
Glucagonoma	• Body and Tail ^Q
Somatostatinoma and PPoma	• Head ^Q
VIPoma	• Tail ^Q

All pancreatic cancers and neoplastic cysts are most common in pancreatic head except:
• Mucinous cystic neoplasm and Glucagonoma: MC in body and tail ^Q
• VIPoma: MC in Tail ^Q
• Insulinoma: Equally distributed ^Q in head, body and tail

PANCREAS DIVISUM

217. Ans. a. Most common congenital anomaly (Ref: Sabiston 19/e p1517; Schwartz 10/e p1365-1366, 9/e p1171; Bailey 26/e p1125, 25/e p1131; Blumgart 5/e p818-819; Shackelford 7/e p1134-1135)

PANCREAS DIVISUM

- MC congenital anomaly of the pancreas^Q
- It occurs when the ductal systems of the dorsal and ventral pancreatic duct fail to fuse^Q during the second month of gestation.

Types

- Type 1 has two completely separate pancreatic ducts.
- Type 2 has only a dorsal duct, with no evidence of a ventral duct of Wirsung.
- Type 3 has a dominant dorsal duct with only a small, narrow filamentous connection between the dorsal and ventral ducts.
 - Common to all variants of pancreas divisum is that all or most pancreatic secretion flows through the accessory papilla^Q.

Treatment

- Operative dorsal duct sphincterotomy, with or without sphincteroplasty^Q, is the preferred surgical treatment.
- Patients with pancreas divisum and acute recurrent pancreatitis are good candidates for endoscopic therapy^Q whereas patients with chronic pancreatitis or chronic pain alone (or both) do not appear to do as well.

ANNULAR PANCREAS

218. Ans. e. Treatment is division of ring (Ref: Sabiston 19/e p1517; Bailey 26/e p1125, 25/e p1137; Blumgart 5/e p823-826; Shackelford 7/e p1179-1180)

ANNULAR PANCREAS

- Circumferential or near-circumferential band of pancreas tissue surrounding the 2nd part of the duodenum^Q
- It is of ventral pancreas origin and is usually proximal to the ampulla^Q.

- Duodenal stenosis or atresia is present at the site of the annulus in 40%^Q
- Down's syndrome^Q (trisomy 21) is present in 15-25%.

- Intestinal malrotation, tracheoesophageal fistula, and congenital heart defects, Meckel's diverticulum and imperforate anus are also not uncommon.

Diagnosis

- Definitive diagnosis is made by ERCP.

Treatment

- Treatment of choice: Duodenoduodenostomy^Q > Duodenojejunostomy.
- Duodenoduodenostomy has replaced duodenojejunostomy as the treatment of choice because it has a lower incidence of postoperative complications, particularly obstruction and blind-loop syndromes^Q.

219. Ans. d. Duodenoduodenostomy (Ref: Blumgart 5/e p823-826)

- Read the text from the latest edition of Blumgart, surgery of liver, biliary tract and pancreas. It clears that duodenoduodenostomy is the treatment of choice for annular pancreas, not the duodenojejunostomy given in Harrison or Maingot.

- **Duodenoduodenostomy** has replaced **duodenojejunostomy** as the **treatment of choice**^Q because it has a **lower incidence** of postoperative complications, particularly **obstruction** and **blind-loop syndromes**^Q.

TREATMENT OF ANNULAR PANCREAS

- A review of the existing literature published in 1980 concluded that “while there is **no single operative procedure of choice**, experience militates against any direct attack on the offending annulus”. This conclusion stands, and any attempt to divide the annulus itself risks the formation of a pancreatic fistula.
- **Early pediatric series established duodenal bypass as the treatment of choice**, although mortality rates remained high, likely related to the presence of other congenital malformations and the lack of supportive care.
- **Duodenoduodenostomy** has replaced **duodenojejunostomy** as the **treatment of choice** because it has a **lower incidence** of postoperative complications, particularly **obstruction** and **blind-loop syndromes**^Q.

220. Ans. a. Complete or partial rotation failure, b. Congenital, c. Normal histology, e. Surgical correction should be done

221. Ans. b. Duodenoduodenostomy

PANCREATIC TRAUMA

222. Ans. a. Hyperamylasemia is not specific (Ref: Sabiston 19/e p462-463, 1545; Schwartz 9/e p179; Bailey 26/e p1125-1126, 25/e p1137-1138; Shackelford 7/e p1234-1239)

PANCREATIC TRAUMA

- Pancreatic injuries are uncommon.
- **Penetrating injuries** into the abdomen are the **MC injuries** seen in **adults**^Q.
- Isolated pancreatic injuries are not common.
- Up to 90% of patients present with associated hepatic, gastric, splenic, renal, colonic, or vascular lesions.
- **MC associated injury** is to a **hollow viscus** (38%)^Q; followed by the liver (19%); and spleen (11%).

Pancreatic Trauma in Children

- **MC mechanism in children** is **abdominal blunt trauma**^Q.
- Direct compression of the epigastrium against the vertebral column and a blunt object (**handlebar**) is typically seen after **bicycle injuries**^Q.
- **MC segment** of the pancreas affected is the **body**^Q.

Pancreatic Organ Injury Scale		
Grade		Type of Injury
I	Hematoma	Minor contusion without duct injury
	Laceration	Superficial laceration without duct injury
II	Hematoma	Major Contusion without duct injury or tissue loss
	Laceration	Major Laceration without duct injury or tissue loss
III	Laceration	Distal transaction or parenchymal injury with duct injury
IV	Laceration	Proximal transaction or parenchymal injury involving ampulla
V	Laceration	Massive disruption of pancreatic head

Diagnosis

- **CT scan: Investigation of choice** to evaluate patients with **abdominal trauma**^Q.
- **CT Findings:** Peripancreatic hematomas, free fluid in the lesser sack, or abnormal thickening of Gerota's fascia suggest pancreatic injury.

- **ERCP: Most reliable test** to demonstrate **pancreatic duct integrity**^Q

- **Isolated pancreatic amylase** level measurement is **not recommended** because up to 40% of patients with pancreatic duct transected have normal serum amylase levels. **Serial quantification levels**^Q increase the sensitivity of the assay.

Treatment

- Definitive treatment is based on surgical findings.
- **Major pancreatic resections** in **stable patients** with **isolated pancreatic injury**^Q.
- **Damage control surgery** is indicated for **complex injuries** or **unstable patients**^Q.
- **Most** (up to 75%) of **deaths occur within the 48 to 72 hours** after trauma, and most are related to **hypovolemic shock**^Q.

Complication

- A **persistent drain output** or **pancreatic fistula** is the **MC complication** after **pancreatic trauma**^Q.

Grading	Treatment of Pancreatic Injuries
Grade I	• Observation alone ^Q
Grade II	• Debridement, drainage, possible repair ^Q
Grade III	• Distal resection, possible Roux-en-Y drainage ^Q
Grade IV and V	• Damage control ^Q , hemostasis/drainage • Resection and possible Roux-en-Y drainage ^Q • Triple-tube decompression ^Q • Pyloric exclusion technique • Duodenal diverticularization ^Q • Pancreaticoduodenectomy

223. Ans. d. HRCT is investigation of choice

224. Ans. b. Fracture is common at the junction of head and body, d. Peritoneal lavage is good for making the diagnosis

225. Ans. d. Amylase increases in 90% cases, e. HRCT is investigation of choice

PANCREATIC TRANSPLANTATION

226. Ans. b. Amylase levels (Ref: Sabiston 19/e p675-679; Schwartz 10/e p340-344, 9/e p290-295; Bailey 26/e p1426-1427, 25/e p1425-1426; Blumgart 5/e p1796-1805; Shackelford 7/e p1251-1260)

- Bailey 25/e p1425: 'Urinary drainage of the pancreas has the advantage that urinary amylase levels can be used to monitor graft rejection'^Q

PANCREATIC TRANSPLANTATION

- The first clinical vascularized pancreas transplant was performed in 1966, by Kelly and Lillhei^Q at the University of Minnesota.
- Three types:
 - Simultaneous kidney and pancreas (SPK) grafts
 - Pancreas after kidney (PAK)
 - Pancreatic transplantation alone (PTA)

Donor Selection

- Organs from younger, leaner, and more hemodynamically stable deceased donors are preferred.
- Deceased donors with hemodynamic instability or that requires high doses of vasopressors are considered high risk.

- Pancreas with significant steatosis is usually avoided because they are associated with a greater chance of postoperative complications, such as pancreatitis, peripancreatic fat necrosis, and infection^Q.

- In addition, donors must be free from recent malignancy, diabetes, and pancreatitis.
- During surgery, the donor pancreas is evaluated for signs of intraparenchymal fat, hematoma, and calcification or scarring that would preclude use of the organ for transplantation.
- Donor factors associated with poor outcome are BMI >30 and age >45 years^Q.

Surgical Procedure

- Exocrine drainage is performed via the intestinal tract or via the urinary tract; most centers now perform enteric drainage of the exocrine secretions^Q.
- The venous drainage of the graft is to the systemic circulation (via an iliac vein or IVC) or to the portal circulation^Q
- Most pancreatic transplant centers now perform systemic venous drainage^Q.
- If possible the vessels are anastomosed to the right iliac vessels of the recipient which are more superficial compared with the left this minimizes the chances of post-transplant thrombosis.

- In pancreas transplantation, enteric drainage and systemic venous drainage is most commonly done^Q.

- For bladder drainage, the graft should be oriented with duodenum inferiorly, whereas for enteric drainage duodenum can be superior or inferior.
- For portal venous drainage, pancreas is placed in mid-abdomen below transverse colon with the duodenum oriented superiorly. Portal vein is anastomosed to branch of SMV in end to side fashion. Enteric drainage must be used for exocrine secretions.
- The pancreas is most conveniently placed in the right iliac fossa with head directed towards the pelvis.

Complications

- Pancreas graft thrombosis:
 - Pancreas graft thrombosis (arterial or venous) is more frequent compared with other solid organ and reflects the relatively low blood flow through the organ.
 - Occurs within the first week^Q after transplantation.
 - In most instances of thrombosis, graft removal is necessary^Q.
 - MC non-immunologic cause of pancreas allograft failure is vascular thrombosis^Q.
- Early pancreatitis (10-20%)

- **Leak:**
 - **Bladder drained transplant** with small leak are managed by **Foley catheter^o** drainage
 - **Enteric-drained transplants** with leak usually require **operative intervention**.

Outcome

- **Hyperglycemia** is a **late indicator of rejection**, and pancreas is often difficult to salvage when hyperglycemia has occurred.
- The total amount of **immunosuppression** pancreas recipients receive is among the **highest** of any solid organ transplant.
- The **1-year** and **5-year** pancreas graft **survivals** are **highest** for **SPK^o**.
- **Rejection** is the **primary cause of graft loss** in the **PTA** subset.

Islet Transplantation

- First **human islet auto transplantation** was performed by **Sutherland^o** at University of Minnesota, in 1977.

Indications of Islet Cell Transplantation

- **Recurrent, severe hypoglycemia**, particularly if decreased awareness of hypoglycemia is present.
- **Severe labile diabetes**, with wide swings in blood glucose throughout the day.

Principle of Procedure

- Current transplantation requires life-long immunosuppression and is limited to the most severe forms of diabetes.
- The **Edmonton regimen^o** avoids steroids and used a unique combination of induction therapy with an **anti IL-2 receptor antibody (daclizumab)** and maintenance therapy with **sirolimus** and **tacrolimus**.
- The crucial factor in the success of the Edmonton protocol was that the **larger numbers of islets** were **transplanted by repeated islet infusions**.
- Around 10% of the total islet mass can maintain normoglycemia after partial pancreatectomy.
- Total islet mass is 1-2 million. Ideal islet mass required are 200,000 islets and **actual required** are **600,000 to 700,000 islet**.
- **Insulin independence** occurs when a threshold of **8000 to 10,000 islets per Kg** of recipient body weight has been transferred.

Complications

- The most feared potential complications include **bleeding** (20%) and **portal vein thrombosis** (<1%).

Four characteristics associated with success

- Preservation of the donor pancreas for **less than 8 hours** before islet isolation
- Transplantation of at least **6000 islets per kilogram** of body weight
- Choice of the **liver** via the portal vein as the **transplant site**
- The use of **antilymphocyte** or **antithymocyte globulin** for induction immunosuppression

MISCELLANEOUS

227. Ans. d. Observe and medical treatment (Ref: Blumgart 5/e p827; Bailey 26/e p1125, 25/e p1137)

PANCREATIC CYST

- **Solitary (congenital, duplication, or dermoid) cysts** of the **pancreas** are **rare^o**.
- **Multiple pancreatic cysts**, lined with cuboidal epithelium, are **more common^o**.
- They are frequently associated with **polycystic disease** of the **liver** or **kidney^o**
- Can be seen in **up to half** of patients with **von Hippel-Lindau disease^o**.
- Pancreatic cysts **only rarely become symptomatic**, and **no treatment is indicated^o**.

228. Ans. b. Ileum

- Terminal ileum is filled with meconium in mucoviscidosis.

229. Ans. a. Juvenile diabetes

- **Type 1 diabetes** is a **T cell-mediated autoimmune disease**, characterized by **lymphocytic infiltration** of the **pancreatic islets^o**.

230. Ans. c. Mesentery (Ref: Sabiston 19/e p1517; Bailey 26/e p1125, 25/e p1137; Blumgart 5/e p827)

ECTOPIC PANCREAS

- The most common sites are in the **walls of the stomach^o**, **duodenum^o**, or **ileum**, in a **Meckels diverticulum^o**, or at the **umbilicus^o**
- Less common sites include the colon, appendix, gallbladder, omentum, and mesentery.
- **Most ectopic pancreatic tissue is functional^o**.
- **Islet tissue** is frequently **present** when ectopic pancreas is located in the **stomach** and **duodenum**.
- Ectopic pancreatic tissue is a **submucosal, irregular nodule** of firm, yellow tissue that has a **central umbilication^o**; pancreatic secretions often exit through this umbilication.

231. Ans. b. Superior mesenteric vein (Ref: BDC 4/e pool-II/284-285)

- The posterior surface of neck of pancreas is related to the termination of superior mesenteric vein and beginning of portal vein^Q.

232. Ans. d. All

233. Ans. c. Insulinoma (Ref: Nelson 18/e p1652)

NESIDIOBLASTOSIS

- Also known as **persistent hyperinsulinemic hypoglycemia of infancy**^Q
- Characterized by **diffuse hyperfunction** of pancreatic **beta cells** with **enlargement of their nuclei**^Q
- Neither the **beta cell proliferation rate** nor the **overall beta cell mass** is increased^Q.

Clinical Features

- **Early recognition** of congenital hyperinsulinism is critical because, if untreated, profound hypoglycemia may lead to brain damage.
- Babies may be described as **jittery, floppy, or lethargic**; **seizures** are common^Q

Diagnosis

- **Inappropriately elevated insulin** in the setting of **hypoglycemia**^Q, along with the **need for continuous glucose infusion** (<15 mg/kg/min) to maintain normoglycemia confirms the diagnosis.
- **Pancreatic venous sampling** is used to make the **diagnosis**^Q.

Treatment

- **Continuous glucose administration** with **suppression** of insulin secretion by **diazoxide** or **somatostatin**^Q.
- Operation is necessary in more than two thirds of cases.
- Treatment consists of **near total (95-98%) pancreatectomy**^Q.

234. Ans. b. Occurs in adults more than children

235. Ans. c. Causes severe hypoglycemia (Ref: KDT 6/e p274, 548, 554)

DIAZOXIDE

- **K⁺ channel opener**, causes **arteriolar dilatation**^Q
- Diazoxide produces **hyperglycemia** by **decreasing insulin**^Q
- **Used in insulinoma**^Q
- When used as **intravenous antihypertensive agent**^Q, it causes excessive hypotension

236. Ans. b. 11 O' clock position (Ref: Sabiston 19/e p1494; Schwartz 10/e p1327, 9/e p1148)

TRANSDUODENAL SPHINCTEROPLASTY

- This cut is made **superiorly** (at the **11' O clock position**)^Q for 4 to 5 mm.
- The **sphincter** is **incised** at the **11' O clock position** to avoid injury to the **pancreatic duct**^Q.

237. Ans. a. Stomach

238. Ans. c. Surgical intervention is required in most because of features of chronic pancreatitis

239. Ans. b. Beta cells (Ref: Sabiston 19/e p946)

Islet Cells	Content
Alpha cells	Glucagon, glicentin ^Q , pancreastatin ^Q
Beta cells	Insulin, amylin ^Q , pancreastatin ^Q
D cells	Somatostatin
D ₂ cells	VIP
G cells	Gastrin
PP cells	Pancreatic polypeptide

240. Ans. b. CT scan (Ref: Sutton 7/e p796)

- CT is the **mainstay of pancreatic imaging**, able to demonstrate **focal masses** within the gland **calcifications**, **duct dilatation**, **cysts**, **abscesses** and associated abnormalities in upper abdominal organs (hepatic metastases), lymph nodes and peri-pancreatic vascular structures.
- CT is a useful tool for **guiding percutaneous pancreatic biopsy** and **cyst aspiration** or **drainage**.

SECTION 3

GASTROINTESTINAL SURGERY

CHAPTERS

- ❖ Esophagus
- ❖ Stomach and Duodenum
- ❖ Peritoneum
- ❖ Intestinal Obstruction
- ❖ Small Intestine
- ❖ Large Intestine
- ❖ Ileostomy and Colostomy
- ❖ Inflammatory Bowel Disease
- ❖ Vermiform Appendix
- ❖ Rectum and Anal Canal
- ❖ Hernia and Abdominal Wall
- ❖ Spleen

Esophagus

MULTIPLE CHOICE QUESTIONS

CONGENITAL DIAPHRAGMATIC HERNIA

- Which of the following is the most important determinant of prognosis in neonatal congenital diaphragmatic hernia (CDH)? (All India 2011)
 - Pulmonary hypertension
 - Delay in surgery
 - Size of defect
 - Gestational age at diagnosis
- Which of the following is the least important prognostic factor in congenital diaphragmatic hernia? (All India 2011)
 - Pulmonary Hypertension
 - Delay in emergent surgery
 - Size of defect
 - Gestational age at diagnosis
- All are true about Bochdalek hernia except: (GB Pant 2011)
 - Posterolateral
 - Left side
 - Present in second decade
 - Congenital
- Most common organ that herniates in Morgagni's hernia:
 - Spleen
 - Liver (MHSSMCET 2009)
 - Stomach
 - Transverse colon
- Which of the following is contraindication for Bag and mask ventilation? (AIIMS June 2000)
 - Septicemia
 - Tracheoesophageal fistula
 - Meconium aspiration
 - Diaphragmatic hernia
- What is not true regarding Bochdalek hernia?
 - Early respiratory distress leading to early diagnosis and treatment are good prognostic sign
 - Stomach and transverse colon are commonest content to herniate
 - Diagnosed prenatally by ultrasound
 - Common on left posterior side
- False regarding Bochdalek hernia is: (AIIMS Nov 93)
 - Spleen and kidney can herniate
 - Occurs posterolaterally
 - Always occurs on right side
 - Hernia may or may not have sac
- Not true about Bochdalek hernia:
 - Seen on right side (Recent Question 2015, AIIMS Nov 97)
 - Associated with hypoplasia of lung
 - Associated with hiatus hernia
 - Pericardial cyst is a differential diagnosis
- The diagnostic feature of congenital diaphragmatic hernia on prenatal ultrasonography is: (AIIMS June 2001)
 - A cyst behind the left atrium
 - Mediastinal shift with normal heart axis

- Peristalsis in the thoracic cavity
- Absence of gas bubble under the diaphragm

- Hernia through foramen of Bochdalek, true statement is: (PGI Dec 98)
 - Congenital hernia
 - Is asymptomatic
 - Seen especially in males
 - Least common
- Most common site of Morgagni hernia: (AIIMS Nov 2006)
 - Right anterior
 - Right posterior
 - Left anterior
 - Left posterior
- In congenital diaphragmatic hernia all are seen except: (JIPMER 99)
 - Common on left side
 - Abdominal distension
 - Can be detected antenatally
 - Heart beat shifted to right
- Morgagni hernia: (APPG 98)
 - Hernia between the costal and sternal part of the diaphragm
 - Hernia through the pleuriperitoneal canal
 - Hernia through the lumbar triangle
 - Hernia through inguinal canal
- A neonate with a scaphoid abdomen and respiratory distress has: (All India 94)
 - Congenital pyloric stenosis
 - Diaphragmatic hernia
 - Volvulus
 - Wilm's tumor

HIATUS HERNIA

- True about hiatus hernia: (PGI June 2008)
 - Surgery is indicated in all symptomatic cases
 - Para-esophageal type is more complicated
 - Para-esophageal type is common type
 - Common in infants
- The most common complication seen in hiatus hernia is: (DNB, 2011, All India 2005)
 - Esophagitis
 - Aspiration pneumonitis
 - Volvulus
 - Esophageal stricture
- True about sliding esophageal hernia in all cases: (PGI June 99)
 - Esophagus always short
 - Cardia goes through hiatus
 - Cardia and fundus goes through hiatus
 - Peritoneal sac goes with paraesophageal hernia

18. Hiatus hernia is treated by: (TN 89)
 a. Surgery when medical treatment has failed
 b. Nissens' fundoplication
 c. Medical treatment only
 d. None of the above
19. A 55-years old male had retrosternal discomfort unrelated to physical exertion. Pain gets worse after lying down there is partial relief with antacids. The most likely diagnosis is: (UPSC 96)
 a. Ischemic heart disease b. Carcinoma esophagus
 c. Achalasia cardia d. Hiatus hernia
20. Most useful investigation in sliding hernia in female: (UPPG 2008)
 a. Fluoroscopy b. Barium-meal
 c. Palpation method d. Ultrasound
21. For hiatus hernia, investigation of choice is: (DPG 2006, DPG 2005)
 a. Barium meal follow through
 b. Barium meal upper GI
 c. Barium meal upper GI in Trendelenberg position
 d. Barium meal double contrast
22. Rosetti modification of Nissen's fundoplication means: (MHSSMCET 2006)
 a. Excludes the stomach wall in the wrap
 b. Include only the posterior stomach wall in the wrap
 c. Include only the anterior stomach wall in the wrap
 d. Include both the anterior and the posterior stomach wall in the wrap
23. Fundoplication is used in treatment of: (DNB 2012, MHPGMCET 2002)
 a. Hiatus hernia b. Achalasia cardia
 c. CHPS d. CA esophagus
24. In Nissen's Fundoplication wrapping is done:
 a. 1/3 b. 1/4 (MHSSMCET 2009)
 c. 3/4 d. 1/2
25. Retrocardiac lucency with air fluid level is seen in: (Recent Questions 2013)
 a. Hiatus hernia
 b. Distal end esophageal obstruction
 c. Eventration of diaphragm
 d. None
- REFLUX ESOPHAGITIS**
26. LES pressure is decreased by all except: (GB Pant 2011)
 a. Alcohol b. Protein
 c. Fat d. Peppermint
27. The lower esophageal sphincter tone (pressure) is increased by:
 a. Glucagon b. Gastrin (COMEDK 2005)
 c. Emptying of the stomach d. Chocolate
28. The gold standard for diagnosis of gastroesophageal reflux disease (GERD) is: (MHCET 2016, JIPMER 2014, Orissa 2011, COMEDK 2008, 2007, PGI June 1998)
 a. Barium swallow b. Endoscopy
 c. 24-hours pH monitoring d. Esophageal manometry
29. A 35-years old lady presented with dysphagia, nocturnal asthma and weight loss for 6 years. The most probable diagnosis is: (COMEDK 2010)
 a. Achalasia cardia
 b. Lye stricture of esophagus
 c. Gastroesophageal reflux disease
 d. Cancer esophagus
30. Which of the following is the earliest indicator of pathological gastroesophageal reflux in infants (GERD)? (All India 2011)
 a. Respiratory symptoms b. Postprandial regurgitation
 c. Upper GI bleed d. Stricture esophagus
31. Best test to diagnose gastroesophageal reflux disease and quantify acid output is: (AIIMS May 2011, Nov 2008)
 a. Esophagogram b. Endoscopy
 c. Manometry d. 24-hours pH monitoring
32. Most important pathophysiological cause of GERD is: (AIIMS May 2012)
 a. Hiatus hernia
 b. Transient LES relaxation
 c. LES hypotension
 d. Inadequate esophageal clearance
33. In GERD, what demonstrates the best anatomical picture? (MHSSMCET 2007)
 a. Barium swallow b. 24-hours pH-monitoring
 c. Endoscopy d. Manometry
34. Most common complication after Nissen's fundoplication: (AIIMS GIS Dec 2011, Dec 2006)
 a. Esophageal injuries b. Stomach injuries
 c. Liver injuries d. Pneumothorax
35. All are true about antireflux surgeries except:
 a. Nissen's is 360 degree complete wrap (JIPMER GIS 2011)
 b. Watson is 90 degree posterior
 c. Toupet is 270 degree posterior
 d. Dor is a partial fundoplication
36. Reflux esophagitis is prevented by: (PGI Dec 2001)
 a. Long intra-abdominal esophagus
 b. Increased intra-abdominal pressure
 c. Right crus of diaphragm
 d. Increased intra-thoracic pressure
37. Which of the following mechanism can not prevent gastroesophageal reflux? (AIIMS Nov 98)
 a. Looping fibers of right crus of diaphragm
 b. Mucosal folds at gastroesophageal junction
 c. Circular muscle fibres of GE sphincter
 d. Angle made by the esophagus with stomach
38. LES sphincter is relaxed by: (PGI Dec 2002)
 a. Nitrates b. H2 blockers
 c. Morphine d. Atropine
 e. Calcium channel blockers
39. Lower esophageal sphincter is relaxed by: (PGI June 2003)
 a. Alcohol b. Caffeine/Tea
 c. Diazepam d. Antacid
40. Which one of the following drugs exacerbate reflux esophagitis? (COMEDK 2004)
 a. Chlorpropamide
 b. Metoclopramide
 c. Theophylline
 d. Cisapride
41. The aim of preventing reflux esophagitis by repairing hiatus hernia is achieved by: (AIIMS 79, Rohtak 87)
 a. Bringing the stomach inferior to diaphragm
 b. Reconstitution of the angle of hill
 c. Repair of defect in diaphragm
 d. All of the above
42. Peptic esophagitis: (UPSC 2000)
 a. Is effectively demonstrated by barium swallow
 b. Is always associated with hiatus hernia
 c. Can be readily confirmed by esophagoscopy
 d. Is associated with the production of higher than normal amounts of gastric acid

43. **Complications of "reflux esophagitis":** (MAHE 2005)
 a. Stricture b. Schatzki's ring
 c. Barrett's esophagus d. All of above
44. **Most common cause of esophagitis is:** (AIIMS May 2009)
 a. Alcohol b. Smoking
 c. Spicy and hot food d. Esophageal reflux

ACHALASIA CARDIA

45. **All are true about achalasia except:** (GB Pant 2011, JIPMER GIS 2011)
 a. It predisposes to malignancy
 b. Body peristalsis is normal
 c. LES pressure is increased
 d. Dilatation of proximal segment
46. **All are manometric features of achalasia except:** (JIPMER GIS 2011)
 a. High LES pressure
 b. Decreased LES relaxation
 c. Segmental body peristalsis
 d. Manometry helps in diagnosis
47. **A female patient has dysphagia, intermittent epigastric pain. On endoscopy, esophagus was dilated above and narrow at the bottom. Treatment is:** (AIIMS May 2012)
 a. PPI b. Esophagectomy
 c. Dilatation d. Heller's cardiomyotomy
48. **Amyl nitrate inhalation test is used to detect:** (COMEDK 2005)
 a. CA esophagus b. Achalasia cardia
 c. Esophageal diverticulum d. Tracheo-esophageal fistula
49. **Increasing difficulty in swallowing both for solids and liquids in a woman with bird's beak appearance in X-ray seen in:** (PGI June 2008)
 a. Achalasia cardia b. Carcinoma
 c. Reflux esophagitis d. Barrett's esophagus
 e. Esophagitis
50. **A 30-years old women comes with dysphagia for both solid and liquids and barium swallow shows parrot beak appearance. On esophageal manometry, LES pressure is increased. Management includes:** (PGI June 2008)
 a. Nitrates b. Ca^{2+} channel blockers
 c. Botulinum toxin d. Myotomy
51. **Heller's operation is done for:** (Recent Question 2014, DNB 2013, DNB 2012, MHPGMCET 2002)
 a. Achalasia cardia b. Hiatus hernia
 c. Diaphragmatic d. Reflux esophagitis
52. **Features of achalasia cardia are all of the following except:** (MCI March 2009, UPSC 96)
 a. Regurgitant vomiting
 b. Elongated and dilated esophagus
 c. Rat-tail deformity and filling defect on barium study
 d. Increased difficulty in swallowing
53. **True about achalasia cardia is:** (PGI June 2002)
 a. Dysphagia is a presenting symptom
 b. The cause is absence of ganglion cells in Auerbach's plexus
 c. Esophagectomy is the treatment
 d. Motility-improving agents are used in treatment
 e. Barium swallow shows irregular filling-defect in lower esophagus
54. **The defect in achalasia cardia is present in:** (MAHE 2008)
 a. Myenteric plexus of Auerbach
 b. Meissner's plexus
 c. Kesselbach's plexus
 d. Mesenteric plexus
55. **In achalasia cardia true is:** (PGI June 2000)
 a. Pressure at distal end increased with no peristalsis
 b. Low pressure at LES with no peristalsis
 c. Pressure >50mm Hg with peristalsis
 d. Pressure at the distal end increased with normal relaxation
56. **A young patient presents with history of dysphagia more to liquid than solids. The first investigation you will do is:** (AIIMS June 2003)
 a. Barium swallow b. Esophagoscopy
 c. Ultrasound of the chest d. CT scan of the chest
57. **Treatment for achalasia associated with high rate of recurrence:** (All India 2002)
 a. Pneumatic dilatation
 b. Laparoscopic myotomy
 c. Open surgical myotomy
 d. Botulinum toxin
58. **About achalasia cardia all are correct except:** (APPG 84, Kerala 86, JIPMER 98)
 a. Mostly in women
 b. Dilated esophagus narrowing to a point
 c. Heller's operation treatment of choice
 d. Not a premalignant condition
59. **Which drug is used for achalasia cardia?** (PGI 88)
 a. Nifedipine
 c. Propranolol
 d. Atenolol
 d. Bethanecol
60. **All are true of achalasia cardia except:** (JIPMER 90)
 a. Dysphagia
 b. Aspiration pneumonitis
 c. Mecholyt test is hyposensitive
 d. X-ray finding of dilated esophagus with a narrow end
61. **Radiologic feature suggestive of achalasia cardia is:** (AIIMS 79, PGI 78)
 a. Absence of gastric air bubble
 b. Air fluid level in mediastinum
 c. Sigmoid esophagus
 d. All of the above
62. **Following are radiological evidence of Achalasia cardia except:** (Karnataka 98)
 a. Smooth narrowing of esophagus
 b. Dilated tortuous esophagus
 c. Absence of air in the fundus
 d. Exaggerated peristalsis
63. **Bird's beak appearance is seen in:** (Recent Question 2015, J and K 2001)
 a. Volvulus
 b. Intussusception
 c. Achalasia
 d. Ulcerative colitis
64. **Achalasia cardia is characterized by all except:** (UPPG 2009)
 a. Most common in women
 b. Dysphagia is most common symptom
 c. Premalignant condition
 d. Parrot beak's appearance
65. **Not used in treatment of achalasia cardia:** (PGI May 2011)
 a. Botulinum toxin
 b. Fundoplication
 c. Myotomy
 d. Balloon dilation
 e. Calcium channel blockers
66. **True about achalasia cardia is all except:** (MHSSMCET 2009)
 a. On repeated Botox injection, recurrence rate increase
 b. More common in young women
 c. Surgery is treatment of choice
 d. Not a premalignant condition

ESOPHAGEAL MOTILITY DISORDERS

67. Corkscrew esophagus is seen in which of the following conditions?

(Recent Question 2015, Bihar PG 2014, NEET 2013, DNB 2008, 2005, 2001)

- a. Carcinoma esophagus b. Scleroderma
- c. Achalasia cardia d. Diffuse esophageal spasm

68. Motility in the upper third of the esophagus is decreased in all except:

(DNB 89)

- a. Pseudo-bulbar palsy b. Chagas disease
- c. Myasthenia gravis d. Scleroderma
- e. Cricopharyngeal carcinoma

69. Most common motility disorder leading to dysphagia:

(JIPMER 2010)

- a. Nut cracker esophagus b. Esophageal web
- c. Diffuse esophageal spasm d. Achalasia cardia

ZENKER'S DIVERTICULUM

70. Best investigation for Zenker's diverticulum is:

(Recent Question 2014, AIIMS Nov 2011, AIIMS GIS Dec 2010)

- a. Barium swallow b. Endoscopy
- c. CECT d. EUS

71. An elderly male present with history of dysphagia, regurgitation, foul breath and cough. Bilateral lung crepts are noted on examination. The most likely diagnosis is:

(All India 2012, AIIMS GIS Dec 2010)

- a. Schatzki's ring b. Zenker's diverticulum
- c. Corkscrew esophagus d. Plummer-Vinson syndrome

72. True statement about Zenker's diverticulum:

- a. Congenital (NEET Pattern, GB Pant 2011)
- b. Feeling of obstruction in esophagus
- c. Traction diverticulum
- d. Not present with recurrent aspiration pneumonitis

73. All of the following statements about Zenker's diverticulum are true except:

(All India 2009)

- a. Acquired diverticulum
- b. Lateral X-rays on barium swallow are often diagnostic
- c. False diverticulum
- d. Out pouching of the anterior pharyngeal wall just above the cricopharyngeus muscle

74. A 50-years old male, Raju presents with occasional dysphagia for solids, regurgitation of food and foul smelling breath. Probable diagnosis is:

(AIIMS June 99)

- a. Achalasia cardia b. Zenker's diverticulum
- c. CA esophagus d. Diabetic gastroparesis

75. Which of the following is true about Zenker's diverticulum?

(PGI Dec 2007)

- a. It is asymptomatic
- b. Occurs in the mid-esophagus
- c. Treatment is simple excision
- d. It occurs in children

76. Commonest complication of Zenker's diverticulum is:

(AIIMS Nov 96)

- a. Dysphonia b. Gastroesophageal reflux
- c. Lung abscess d. Perforation

77. A male patient of age 60 years has foul breath. He regurgitates food that is eaten 3 days ago: Likely diagnosis is:

- a. Zenker's diverticulum b. Meckel's diverticulum
- c. Scleroderma d. Achalasia cardia

78. The pharyngeal diverticulum is a protrusion of mucosa between:

(UPSC 2000)

- a. The two parts of inferior constrictor muscle of the pharynx
- b. The two parts of middle constrictor muscle of the pharynx
- c. The two parts of the superior constrictor muscle of the pharynx
- d. Cricopharyngeal and posterior part of suprahyoid membrane

79. Dohlman's procedure is used in:

(Recent Questions 2013)

- a. Rectal prolapsed b. Esophageal achalasia
- c. CA esophagus d. Zenker's diverticulum

SCLERODERMA

80. Not a component of POEMS syndrome:

(JIPMER 2010)

- a. Polyneuropathy b. Esophageal atresia
- c. Endocrinopathy d. Multiple myeloma

81. Acronym 'POEMS' stand for:

(PGI May 2011)

- a. Esophageal dysmotility b. Polyneuropathy
- c. Endocrinopathy d. M-protein
- e. Scleroderma

82. Which part of esophagus is mainly affected in scleroderma?

(MHPGMCET 2003)

- a. Upper third b. Middle third
- c. Lower third d. All the above

83. Connective tissue disorder which is associated with gastroesophageal reflux is:

(PGI Dec 99)

- a. SLE b. Scleroderma
- c. Behcet's syndrome d. Dermatomyositis

PLUMMER-VINSON SYNDROME

84. Patterson Brown Kelly syndrome is characterized by all except:

(PGI June 2000)

- a. Lower esophageal web
- b. Iron deficiency anemia
- c. Common in adult female
- d. Premalignant

85. Dysphagia in Plummer-Vinson syndrome is due to:

- a. Post cricoids region commonly involved in web formation
- b. Web is common in lower region
- c. It is due to abnormal vessels
- d. Web is common in middle zone
- e. Decreased motility of esophagus

86. Not true about Plummer-Vinson syndrome is:

(AIIMS 97)

- a. Occurs in elderly males
- b. Post cricoids web
- c. Predispose to hypopharynx malignancy
- d. Koilonychia

87. Which of the following statement regarding Plummer-Vinson syndrome is not true?

(Kerala 2000)

- a. It is otherwise know as Patterson-Brown Kelly disease
- b. Iron deficiency anaemia is probably the basic cause
- c. It occurs exclusively in men
- d. Prone to post cricoid cancer

88. In Plummer-Vinson syndrome, obstruction is due to:

(DPG 2006)

- a. Esophageal dysmotility b. Esophageal stenosis
- c. Post cricoid webs d. None of the above

89. All are features of Plummer-Vinson syndrome except:

(COMEDK 2008)

- a. Esophageal web
- b. Iron deficiency
- c. Achalasia Cardia
- d. Dysphagia

90. Not a feature of Plummer-Vinson syndrome: (Punjab 2008)
- Web present in lower part of esophagus
 - Koilonychia
 - Premalignant
 - Common in edentulous females

BARRETT'S ESOPHAGUS

91. True about Barrett's esophagus: (PGI Dec 2007)
- Long esophageal segment involved
 - Metaplasia
 - Peptic ulcer
 - Para esophageal hernia
 - Leads to adenocarcinoma
92. A chronic alcoholic presents with regurgitation and retrosternal pain. Endoscopic biopsy confirms. Barrett's esophagus. What is most appropriate management in this case? (JIPMER 2013)
- Endoscopic biopsy every 2 years
 - PPI
 - H. pylori treatment
 - Balloon dilatation
93. Barrett's esophagus is: (All India 2002, AIIMS June 93)
- Lower esophagus lined by columnar epithelium
 - Upper esophagus lined by columnar epithelium
 - Lower esophagus lined by ciliated epithelium
 - Lower esophagus lined by pseudo stratified epithelium
94. Barrett's esophagus is diagnosed by: (AIIMS May 2012, Nov 2007, DNB 2008)
- Squamous metaplasia
 - Intestinal metaplasia
 - Squamous dysplasia
 - Intestinal dysplasia
95. Barrett's esophagus can lead to: (AIIMS June 98)
- Stricture
 - Reflux esophagitis
 - Peptic ulcer
 - Achalasia
96. True about Barrett's esophagus: (PGI Dec 2003)
- Premalignant
 - Predispose to squamous cell carcinoma
 - Can be diagnosed by endoscopy
 - Biopsy is necessary to diagnose
 - Stricture may be present in high esophagus
97. True regarding Barrett's esophagus is: (AIIMS Nov 95)
- Benign course
 - Premalignant condition
 - Squamous metaplasia of lower esophagus
 - Medical treatment is not useful
98. Barrett's ulcer is due to: (JIPMER 93)
- Ischemia
 - Ectopic gastric mucosa
 - Bile reflux
 - Reflux esophagitis

CARCINOMA ESOPHAGUS PREDISPOSING FACTORS

99. All are the predisposing factors for carcinoma esophagus are all except: (COMEDK 2011)
- Achalasia
 - Paterson Brown Kelly Syndrome
 - Zenker's diverticulum
 - Ectodermal dysplasia
100. All are risk factors for epidermoid carcinoma except: (ILBS 2011)
- Achalasia
 - Barrett's esophagus
 - Nitrosamines
 - Corrosives

101. Premalignant lesion of carcinoma esophagus includes: (PGI Nov 2011, June 2007)
- Tylosis
 - Plummer-Vinson syndrome
 - Barrett's esophagus
 - Achalasia cardia
 - Scleroderma
102. Squamous cell carcinoma of esophagus is caused by: (MHPGMCET 2009)
- Tobacco/Alcohol
 - Alkalies
 - GERD
 - All of the above
103. Which is not a predisposing factor for carcinoma esophagus? (Orissa 2011)
- Esophageal diverticula
 - Plummer-Vinson syndrome
 - Mediastinal fibrosis
 - Caustic ingestion
104. The adenocarcinoma of esophagus develops in: (Bihar PG 2014, COMEDK 2014, All India 2002, 98)
- Barrett's esophagus
 - Long standing achalasia
 - Corrosive stricture
 - Alcohol abuse
105. Esophageal carcinoma is not predisposed by: (PGI June 99, PGI Dec 95)
- Achalasia
 - Scleroderma
 - Corrosive intake
 - Barrett's esophagus
106. In carcinoma esophagus predisposing factors: (PGI Dec 2002, Dec 2000)
- Tylosis
 - Smoking
 - Lye stricture
 - Reflux esophagitis
107. Not a predisposing factor for carcinoma esophagus: (AIIMS May 2009)
- Diverticula
 - Human papilloma virus
 - Mediastinal fibrosis
 - Caustic ingestion
108. All are pre-malignant lesions for CA esophagus except: (PGI SS June 2005)
- Caustic injuries
 - Tylosis
 - Achalasia
 - Nutcrackers esophagus
109. Risk factors for carcinoma esophagus are all except: (GB Pant 2011)
- H. pylori
 - Plummer vinson syndrome
 - Corrosives
 - Achalasia
110. Which is not a risk factor for squamous cell carcinoma of esophagus? (AIIMS GIS Dec 2011, May 2008)
- H. pylori
 - Scleroderma
 - Smoking and alcohol
 - Lye strictures
111. Risk factor for adenocarcinoma of esophagus: (KGMC 2011)
- Barrett's esophagus
 - Corrosive injury
 - Achalasia cardia
 - All of the above

CA ESOPHAGUS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

112. Which of the following is best indicator of survival in CA esophagus? (AIIMS GIS May 2008)
- TNM stage
 - Resection margin
 - Histology and location
 - Size of tumor
113. Best prognosis in CA esophagus: (AIIMS GIS Dec 2010)
- Polypoidal
 - Fungating
 - Ulcerative
 - Infiltrative
114. Sievert classification is for: (KGMC 2011)
- Esophageal cancer
 - Stomach cancer
 - GE junction tumors
 - CA pancreas

115. **Best result in esophageal carcinoma in-situ with:** (AIIMS GIS Dec 2006)
 a. Endoscopic mucosal resection
 b. THE
 c. TTE
 d. PDT
116. **Characteristic features of LN involvement on EUS in CA esophagus are all except:** (AIIMS GIS Dec 2011, May 2008)
 a. Round contour
 b. Sharp border
 c. Hyperechogenic
 d. Size >1 cm
117. **Most commonly used chemotherapy regimen used in CA esophagus:** (AIIMS GIS May 2008)
 a. 5-FU + Cisplatin
 b. Cisplatin + Vinblastine
 c. Cisplatin + Paclitaxel
 d. Cisplatin + Epirubicin
118. **Which is not used in palliation in CA esophagus?** (AIIMS GIS May 2008)
 a. EMR
 b. Photodynamic therapy
 c. Laser therapy
 d. Self-expanding stents
119. **T-staging of esophagus is best done by:** (AIIMS GIS Dec 2011, DNB 2002)
 a. EUS
 b. CT
 c. MRI
 d. PET
120. **Commonest site of esophagus carcinoma is:** (UPPG 2008)
 a. Upper 2/3rd
 b. Middle 1/3rd
 c. Lower 1/3rd
 d. Crico-esophageal junction
121. **Barium esophagogram findings in carcinoma esophagus are all except:** (UPPG 2009)
 a. Rat-tail deformity
 b. Pencil tip appearance
 c. Apple-core appearance
 d. Filling defect
122. **MC site of CA esophagus is:** (Recent Question 2015, AIIMS Feb 2007)
 a. Middle 1/3rd
 b. Upper 1/3rd
 c. Lower 1/3rd
 d. Lower end of esophagus
123. **The commonest site of carcinoma esophagus in India is:** (AIIMS Nov 2003)
 a. Upper 1/3rd
 b. Middle 1/3rd
 c. Lower 1/3rd
 d. GE junction
124. **A patient presents with dysphagia of 4 weeks duration. Now he is able to swallow liquid food only. Which of the following is the one investigation to be done?** (DPG 2009 Feb)
 a. Barium studies
 b. Upper GI endoscopy
 c. CT Scan
 d. Esophageal manometry
125. **In CA esophagus:** (PGI SS Dec 2009)
 a. Adenocarcinoma is most common in middle 1/3rd
 b. Barrett's esophagus leads to squamous cell carcinoma
 c. 5 year survival is 30%
 d. EUS can accurately stage the disease
126. **Treatment of choice for CA esophagus:** (PGI SS Dec 2009)
 a. Esophagectomy
 b. External radiotherapy
 c. Internal radiotherapy
 d. Chemotherapy
127. **Stage of CA esophagus is best decided by:** (PGI SS June 2009)
 a. Depth of tumor
 b. Size of tumor
 c. Histopathological grade
 d. Age of the patient
128. **Esophageal carcinoma is adequately assessed by:** (PGI SS Dec 2009)
 a. Barium swallow
 b. Barium swallow + endoscopy
 c. Endoscopy
 d. USG
129. **Most common complication of placing stent in CA esophagus:** (AIIMS GIS May 2011)
 a. Migration
 b. Chest pain
 c. Perforation
 d. Bleeding
130. **Lymph node metastasis in CA esophagus is best detected by:** (AIIMS GIS May 2011)
 a. PET
 b. EUS
 c. CT
 d. Thoracoscopy + laparoscopy
131. **Best palliation in CA esophagus:** (GB Pant 2011)
 a. Surgical bypass
 b. Surgical placement of MB tube
 c. Endoprosthesis
 d. Feeding jejunostomy
132. **Most common site for squamous cell CA esophagus is:** (All India 2001)
 a. Upper third
 b. Middle third
 c. Lower third
 d. Gastro-esophageal junction
133. **True about CA esophagus:** (PGI Dec 2003)
 a. MC in middle 1/3rd
 b. Adenocarcinoma is common variety
 c. Carcinoma develops at the achalasia segment
 d. Smoking is a risk factor
 e. Endoscopy is the investigation of choice
134. **Rat-tail appearance is seen in:** (UPPG 2009)
 a. Achalasia cardia
 b. Carcinoma esophagus
 c. Scleroderma
 d. Reflux esophagitis
135. **CA esophagus is characterized by following except:** (PGI June 98, PGI Dec 96)
 a. Adenocarcinoma
 b. Middle 1/3rd affected
 c. Dysphagia is characteristic
 d. Pernicious anemia often present
136. **Treatment of advanced esophageal cancer is:** (DNB 2006)
 a. Chemoradiation only
 b. Curative en-bloc resection
 c. Chemoradiation followed by curative en-bloc resection
 d. Chemoradiation followed by palliative en-bloc resection
137. **True about esophageal carcinoma:**
 a. Adenocarcinoma is on the rise
 b. Surgery is best treatment
 c. Hoarseness of voice occurs in late cases
 d. Presentation is early
 e. Prognosis is good because of its site
138. **Regarding esophagus malignancy-operation all are true except:** (MHSSMCET 2009)
 a. Thoracoscopic assisted surgery
 b. Radiotherapy
 c. Chemotherapy + surgery
 d. Transhiatal esophagectomy
139. **Transhiatal esophagectomy was planned for adenocarcinoma of lower end of esophagus. The approach would be in the following order:** (AIIMS Nov 2007)
 a. Abdomen-Neck
 b. Abdomen-Thorax-Neck
 c. Neck-Thorax-Abdomen
 d. Abdomen-Thorax
140. **True about carcinoma esophagus is:** (Kerala 94)
 a. Most common site is lower end
 b. Both adeno and squamous cell carcinoma occur
 c. Commonest histology is adenocarcinoma
 d. More common in females
141. **Which is the most reliable diagnostic method for staging the esophageal cancer?** (UPSC 2006)
 a. MRI
 b. Endoscopic ultrasound
 c. CT scan
 d. Thoracoscopy

142. Early stage of carcinoma esophagus is diagnosed by:
 a. Barium meal (UPPG 2008)
 b. Trans-esophageal USG
 c. MRI
 d. Endoscopy

143. False statements about carcinoma esophagus are all of the following except: (MCI March 2009)
 a. Most common in lower third
 b. Histologically, adenocarcinoma only
 c. Unrelated to tobacco chewing
 d. It is more common in females

144. Which of the following should never be carried out as a treatment for carcinoma esophagus? (MHSPGMCET 2008)
 a. Gastrostomy for palliation
 b. Radiotherapy alone
 c. Radical esophagectomy
 d. Radiotherapy and chemotherapy

145. Treatment of SCC of esophagus: (GB PANT 2011)
 a. Cisplatin b. Etoposide
 c. Adriamycin d. Bleomycin

146. In Esophageal cancer prognosis is best determined by: (AIIMS May 2015)
 a. Cellular differentiation b. Age of patient
 c. T stage d. Length of involvement

ESOPHAGECTOMY

147. Conduit in gastric pull up is based on: (AIIMS GIS Dec 2011, May 2008)
 a. Right gastric and right gastroepiploic artery
 b. Right gastric and left gastroepiploic artery
 c. Left gastric and right gastroepiploic artery
 d. Left gastric and left gastroepiploic artery
148. Which is the best substitute for esophagus? (MHSSMCET 2005, MP 99, All India 96, PGI Dec 95)
 a. Stomach b. Jejunum
 c. Left sided colon d. Right sided colon
149. First successful esophagectomy was done by: (AIIMS GIS Dec 2011)
 a. Miculiz b. Kaplan
 c. Torek d. Orringer
150. Ivor Lewis operation is the treatment of choice for cancer involving ____ esophagus: (MHSSMCET 2009)
 a. Upper 1/3rd
 b. Middle 1/3rd
 c. Lower 1/3rd
 d. Entire esophagus
151. Which of the following surgical approach was first described by Orringer for the management of carcinoma esophagus? (J & K 2005)
 a. Transhiatal
 b. Thoracoscopic
 c. Left thoracoabdominal
 d. Right thoracoabdominal
152. Best conduit for esophageal reconstruction: (DPG 2007)
 a. Colon b. Stomach
 c. Appendix d. Ileum
153. Commonest cause for mortality in Ivor Lewis operations: (AIIMS Nov 98)
 a. Pulmonary atelectasis
 b. Anastomotic leak
 c. Thoracic duct fistula
 d. Sub diaphragmatic collection

154. Which of the following operations was first described by Orringer? (COMEDK 2006)
 a. En-bloc esophagectomy
 b. Transhiatal esophagectomy
 c. Thoracoscopic esophagectomy
 d. Transthoracic esophagectomy

155. The ideal replacement for the esophagus after esophagectomy is: (COMEDK 2010)
 2a. Stomach b. Jejunum
 c. Colon d. Synthetic stent

156. After esophagectomy, stomach tube is based on supply form: (MHSSMCET 2006)
 a. Right gastroepiploic artery
 b. Right gastric artery
 c. Left gastroepiploic artery
 d. Left gastric artery

LEIOMYOMA

157. Commonest benign tumor of the esophagus: (JIPMER 2014, DPG 2009 Feb)
 a. Leiomyoma b. Papilloma
 c. Adenoma d. Hemangioma
158. Endoscopic treatment of leiomyoma of esophagus is contraindicated due to: (JIPMER GIS 2011)
 a. Infection
 b. Chances of dissemination
 c. Perforation
 d. Perforation and dissemination

DYSPHAGIA

159. Intermittent dysphagia is caused by: (PGI June 2004)
 a. Stricture
 b. Reflux esophagitis
 c. Achalasia cardia
 d. Pharyngeal diverticulum
 e. Diffuse esophageal spasm
160. A 60-years old patient presenting with dysphagia of 6 weeks duration with solid foods, now can swallow only liquids. Investigation done for diagnosis: (PGI Dec 2003)
 a. CXR
 b. Ba swallow
 c. Endoscopy
 d. USG
 e. CT Scan
161. Investigation of choice for dysphagia for solids: (PGI Dec 2000)
 a. Barium swallow b. Endoscopy
 c. X-ray chest d. C.T. Scan
162. Odynophagia occurs in: (AIIMS GIS Dec 2011, PGI June 96)
 a. Achalasia
 b. Herpes esophagitis
 c. Monilial esophagitis
 d. Barrett's esophagus
163. A 40-years old female patient presented with dysphagia to both liquids and solids and regurgitation for 3 months. The dysphagia was non-progressive. What is the most likely diagnosis? (AIIMS May 2006)
 a. Carcinoma of the esophagus
 b. Lower esophageal mucosal ring
 c. Achalasia cardia
 d. Reflux esophagitis with esophageal stricture

DYSPHAGIA LUSORIA

164. **Dysphagia lusoria is caused by:** (Karnataka 2013, PGI SS June 2001)
- Abnormal elongation of arch of aorta
 - Aneurysm of arch of aorta
 - Esophageal web
 - Esophageal diverticula
165. **Dysphagia lusoria is due to:** (Recent Question 2014, AIIMS Nov 2003)
- Esophageal diverticulum
 - Aneurysm of aorta
 - Esophageal web
 - Compression by aberrant blood vessel
166. **All are true about dysphagia lusoria except:** (DPG 2008)
- Right aortic arch
 - Vascular ring
 - Due to aberrant subclavian artery causing pressure on esophagus
 - Acquired in later life

ESOPHAGEAL PERFORATION AND INJURY

167. **Mackler's triad includes:** (PGI Nov 2009)
- Vomiting
 - Subcutaneous emphysema
 - Lower thoracic pain
 - Peripheral cyanosis
 - Pleural effusion
168. **True about Boerhaave's syndrome:** (PGI Nov 2009)
- MC at lower 1/3rd
 - Hematemesis is early symptoms
 - Acute chest pain
 - Surgically treated
 - Operation is done after 24 hours
169. **True about esophageal injury:** (PGI June 2009)
- Barium swallow is diagnostic
 - Treatment is primary repair
 - MC after penetrating injury
 - Mortality increased if repair after 24 hours
170. **Boerhaave's syndrome, true is:** (PGI May 2005)
- Iatrogenic
 - Silent manifestation
 - Present with acute chest pain
 - Treatment is surgical
171. **Which is M.C. site for iatrogenic esophageal perforation:** (Recent Question 2014, DNB 2013, DNB 2012, AIIMS Nov 97)
- | | |
|------------------------|------------------------|
| a. Abdominal portion | b. Cervical portion |
| c. Above arch of aorta | d. Below arch of aorta |
172. **During esophagoscopy, the area in the esophagus mostly perforated is:**
- At aortic arch
 - Mid esophagus
 - At cricopharyngeus muscle
 - At esophagogastric junction
173. **Commonest cause of esophageal perforation is:**
- | | |
|--------------------|---------------------------|
| a. Acid ingestion | b. Hyperemesis |
| c. Instrumentation | d. Carcinoma infiltrating |
174. **Esophageal perforation during endoscopy occurs at:** (PGI SS June 2009)
- Upper esophageal sphincter
 - Aortic arch
 - Right bronchus
 - GE junction

175. **A 40 years old female presents with perforation of distal third of esophagus. Best form of management is:** (JIPMER GIS 2011)
- Antibiotics and drainage
 - Tubal drainage
 - Primary resection and anastomosis
 - Esophagectomy with bringing proximal end as fistula in neck
176. **In majority of patient with esophageal leaks in thoracic cavity of less than 12 hours duration, the treatment of choice is:** (UPSC 97)
- Primary closure, drainage and antibiotics
 - Early esophagostomy
 - Exclusion and diversion of continuity
 - Total esophagectomy and gastric pull up
177. **Best flap for esophagus repair:**
- | | |
|------------|---------------------|
| a. Colon | b. Stomach |
| c. Jejunum | d. Latissimus dorsi |
178. **In esophageal perforation all are seen except:** (UPPG 2000)
- | | |
|----------|----------------|
| a. Pain | b. Bradycardia |
| c. Fever | d. Hypotension |

179. **Boerhaave's syndrome is due to:** (DNB 2012, UPPG 2007)
- Drug induced esophagus perforation
 - Corrosive injury
 - Spontaneous perforation
 - Gastro-esophageal reflux disease
180. **When a 'spontaneous perforation' of the esophagus occurs as a result of severe barotrauma while a person vomits against a closed glottis, the condition is known as:** (UPSC 2008)
- Mallory-Weiss syndrome
 - Plummer-Vinson syndrome
 - Kartagener syndrome
 - Boerhaave's syndrome
181. **Longitudinal tear of esophagus is seen in:** (MHPGMCET 2002)
- | | |
|---------------------------|---------------------------|
| a. Boerhaave's syndrome | b. Mallory-Weiss syndrome |
| c. Nutcracker's esophagus | d. Lye stricture |
182. **Most common site of perforation of esophagus during esophagoscopy is:** (MHSSMCET 2005)
- | | |
|-------------------------|-------------------------------|
| a. Cricopharynx | b. Right atrial indentation |
| c. Bronchus indentation | d. Gastro esophageal junction |
183. **In Boerhaave's syndrome, perforation of esophagus is seen at?** (MHSSMCET 2009)
- | | |
|--------------------|--------------------|
| a. Upper anterior | b. Lower posterior |
| c. Upper posterior | d. Lower anterior |

184. **Most common site a spontaneous rupture of esophagus is:** (DNB 2009)
- Cricopharyngeal junction
 - Cardioesophageal junction
 - Mid esophagus
 - After the crossing of arch of aorta
185. **Investigation of choice for esophageal rupture is?** (DNB 2014)
- Dynamic MRI
 - Rigid esophagoscopy
 - Barium contrast swallow
 - Water soluble low molecular weight contrast swallow

TRACHEOESOPHAGEAL FISTULA

186. **Esophageal atresia is most commonly associated with:** (KGMU 2011)
- Respiratory anomalies
 - Anorectal malformations
 - Genitourinary
 - CVS

187. **Most common type of TEF:** (COMEDK 2014, KGMC 2011)
- Esophageal atresia with fistula with distal segment
 - Esophageal atresia with fistula with proximal segment
 - H shaped TEF
 - Esophageal atresia only

188. **The most common type of tracheoesophageal fistula is:** (Recent Question 2014, MAHE 2008, 2007)
- Esophageal atresia without tracheoesophageal fistula
 - Esophageal atresia with proximal tracheoesophageal fistula
 - Esophageal atresia with distal tracheoesophageal fistula
 - Esophageal atresia with proximal and distal tracheoesophageal fistula

189. **The commonest type of tracheoesophageal fistula is:**
- Proximal end blind, distal end communicating with trachea (PGI June 99)
 - Distal end blind, proximal end communicating with trachea
 - Both ends blind
 - Both ends open

190. **Malignant tracheoesophageal fistula best treated with:** (PGI May 2005)
- Radiotherapy
 - Chemotherapy
 - Stenting
 - Tube
 - Surgical correction

191. **Treatment of malignant trachea-esophageal fistula includes:** (PGI June 2007)
- Expandable metal stent
 - Surgery with graft
 - Gastrostomy tube
 - Radiotherapy
 - Chemotherapy

192. **Most common type of tracheoesophageal fistula is:** (MHPGMCET 2001)
- H-type
 - Lower end connected to trachea
 - Upper end connected to trachea
 - Both ends blind

193. **Which one of the following life - threatening congenital anomalies in the newborn presents with polyhydramnios, aspiration pneumonia, excessive salivation and difficulty in passing a nasogastric tube?** (APPG 2016)
- Choanal atresia
 - Tracheo-esophageal fistula
 - Diaphragmatic hernia
 - Gastroschisis

ESOPHAGEAL RINGS AND WEBS

194. **Schatzki's ring is:** (PGI Dec 98)
- Mucosal ring at squamo-columnar junction
 - Muscular ring
 - Dysphagia is the symptom
 - Inflammatory stricture

195. **Schatzki ring is seen at:** (UPPG 2009)
- Mid-esophagus
 - Lower-esophagus
 - Junction of lower esophagus
 - None

196. **False about Schatzki Ring is:** (Punjab 2007)
- Occurs at lower part of esophagus
 - Involves mucosa and submucosa

- Involves mucosa, submucosa and muscularis
- Located at squamo-columnar junction

197. **True about Schatzki's ring:** (PGI Nov 2010)
- Has skeletal muscle
 - Located at lower esophagus
 - Causes dysphagia
 - Contain all layers of esophagus

198. **Schatzki ring:** (DNB 2007, MHSSMCET 2007)
- Can be treated by PPI alone
 - Occurs at GE junction
 - Type A ring
 - Type C ring

FOREIGN BODY

199. **A foreign body usually gets arrested in which part of esophagus?** (DNB 2003)
- Cardiac part of the esophagus
 - In the middle third of the esophagus
 - Below the cricopharynx
 - Above the cricopharynx

ESOPHAGUS ANATOMY AND PHYSIOLOGY

200. **Which of the following is true about esophageal anatomy?** (JIPMER GIS 2011)
- Cervical esophagus is posterior and little right to trachea
 - Thoracic esophagus is crossed by aortic arch posteriorly
 - Thoracic esophagus is crossed by left main bronchus posteriorly
 - Lower esophagus before entering the diaphragm is anterior and left sided

201. **Non progressive contraction of esophagus are:** (AIIMS May 2011, All India 2009)
- Primary
 - Secondary
 - Tertiary
 - Quaternary

202. **Which structure crosses the esophagus at 25 cm from the incisor teeth?** (PGI 88)
- Arch of aorta
 - Bifurcation of trachea
 - Left bronchus
 - Left subclavian artery

203. **Distance between upper incisors and gastro esophageal junction is:** (DPG 97)
- 25 cm
 - 30 cm
 - 40 cm
 - 60 cm

204. **Which figures are very important to the esophagoscopist?** (PGI 81, AIIMS 86)
- 10, 20 and 30
 - 15, 25 and 40
 - 20, 30 and 40
 - 25, 35 and 45

205. **Third constriction of the esophagus is at the level of:** (CMC 98)
- Left bronchus crossing the aorta
 - Where it pierces the diaphragm
 - Junction of the esophagus and stomach
 - Cricopharynx

206. **Structure not passing through the esophageal hiatus:** (AIIMS Nov 2011)
- Left phrenic nerve
 - Right vagus nerve
 - Left vagus nerve
 - Left gastric artery

207. **The normal narrowing in the middle of the esophagus is caused by:** (COMEDK 2007)
- Azygos vein
 - Hemiazygos vein

- c. Right main stem bronchus
- d. Left main stem bronchus

208. False statement about esophagus: (PGI Nov 2011)

- a. Thoracic esophagus is supplied directly by aorta
- b. Bleeding from varices occurs from midesophagus
- c. Cervical esophagus drains to deep cervical nodes
- d. It has rich lymphatic network
- e. Abdominal part of esophagus drains to left gastric

DIAPHRAGM

209. Fluoroscopy is used for diagnosis of: (PGI June 98)

- a. LV function
- b. Diaphragmatic palsy
- c. Valvular calcification
- d. Pericardial effusion

210. Diagnosis of traumatic rupture of diaphragm is made by: (PGI June 2007)

- a. Laparoscopy
- b. Chest X ray
- c. Diagnostic peritoneal lavage
- d. CT

211. Diaphragm develops from all of the following structures, except: (All India 2011)

- a. Septum transversum
- b. Pleuroperitoneal membrane
- c. Cervical myotomes
- d. Dorsal mesocardium

212. Which of the following incisions is taken for diaphragmatic surgery? (AIIMS May 2014)

- a. Transverse
- b. Circumferential
- c. Vertical
- d. Radial

MISCELLANEOUS

213. Pressure of esophagus is __mm below ambient:

- a. 3
- b. 5
- c. 12
- d. 18

214. 'Pencil tip' deformity is seen in:

(PGI June 95)

- a. Carcinoma esophagus
- b. Achalasia cardia
- c. Barrett's esophagus
- d. None of the above

215. Maximum dilatation of esophagus occurs in:

(Kerala 94)

- a. Carcinoma at gastro esophageal junction
- b. Achalasia cardia
- c. Stricture at lower end
- d. CREST syndrome

216. Second swallowing in barium meal studies is found in:

(JIPMER 95)

- a. Pharyngeal pouch
- b. Achalasia cardia
- c. Scleroderma
- d. Reflux esophagitis

217. Hamman's sign is seen with:

(MHPGMCET 2006)

- a. Acute pericarditis
- b. Aortic dissection
- c. Tracheal compression
- d. Esophageal perforation

218. Stricture esophagus is dilated with __F dilator?

- a. 30
- b. 40
- c. 50
- d. 60

219. Stricture esophagus may be treated by: (MHSSMCET 2009)

- a. Metallic stent
- b. Guide wire directed stent
- c. Expandable stents
- d. Esophagectomy

220. The Roux loop should be at least how long to avoid bile reflux esophagitis? (MHSSMCET 2010)

- a. 30 cm
- b. 40 cm
- c. 50 cm
- d. 60 cm

EXPLANATIONS

CONGENITAL DIAPHRAGMATIC HERNIA

1. **Ans. a. Pulmonary hypertension** (Ref: Sabiston 19/e p1834-1836; Schwartz 10/e p1603-1605, 9/e p1416-1418; Bailey 26/e p119, 25/e p84-85; Shackelford 7/e p506; Nelson 18/e p748)

CONGENITAL DIAPHRAGMATIC HERNIA (BOCHDALEK HERNIA OR POSTEROLATERAL HERNIA)

- CDH term is used for **Bochdalek hernia**^Q

- The reported incidence is **1 in 2000 to 5000**^Q live births.
- **Most CDH defects** are on the **left side (80%)**; up to **20%** on **right side**^Q.

- Rarely bilateral
- The exact **survival rate** for CDH is in the range of **70% to 90%**^Q.
- **Bag and Mask ventilation** is **contraindicated** in CDH^Q.

Pathogenesis

- The cause is thought to result from **failure of normal closure** of the **pleuroperitoneal canal**^Q in the developing embryo.
- As a result, **abdominal contents herniate** through the resultant defect in the **posterolateral diaphragm** and **compress** the **ipsilateral developing lung**^Q.

- The **posterolateral location** of this hernia is known as **Bochdalek hernia**^Q and is distinguished from the congenital hernia of the **anteromedial, retrosternal diaphragm**, which is known as **Morgagni hernia**^Q.

- **Compression** of the lung results in **pulmonary hypoplasia** involving both lungs, with the **ipsilateral lung** being the **most affected**^Q.
- **Pulmonary vasculature** is distinctly **abnormal** in that the **medial muscular thickness** of the **arterioles** is **excessive** and **extremely sensitive** to the **multiple local and systemic factors** known to **trigger vasospasm**^Q.

- **Main factors** affecting morbidity and mortality: **Pulmonary hypoplasia** and **pulmonary hypertension**^Q.

Clinical Features

- Classic triad: **Respiratory distress + Dextrocardia + Scaphoid abdomen**^Q

- The MC presentation is **respiratory distress** due to severe hypoxemia.
- The infant appears **dyspneic, tachypneic, and cyanotic**, with severe retractions.
- The **anteroposterior diameter** of the **chest** may be **large**, and the **abdomen** may be **scaphoid**^Q.

Diagnosis

- The **diagnosis** is made at the time of a **prenatal ultrasound** during pregnancy.
- The **postnatal diagnosis** by a **plain chest radiograph** demonstrates the **gastric air bubble** or **loops of bowel** within the **chest**^Q.
- There may also be a **mediastinal shift away** from the **side of the hernia** or **polyhydramnios**^Q from the obstructed stomach.
- **Pneumothorax** always occurs on **contralateral** to the **side of CDH**^Q.

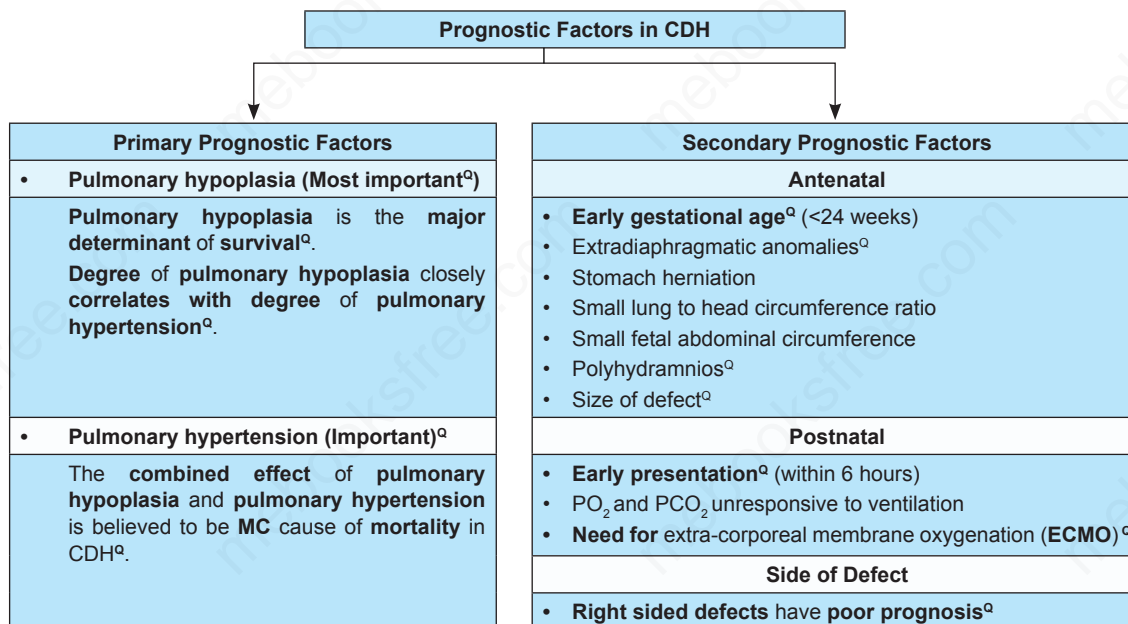
Treatment

- **Physiologic stress** associated with **early repair** probably **adds more insult** and that **survival is not improved**^Q when compared with delayed repair.
- A variable period of time (**24-72 hours**) to allow for **stabilization** before **surgical repair**^Q.

- The **viscera** are **reduced** into the abdominal cavity, and the **posterolateral defect** in the diaphragm is **closed** using **interrupted, nonabsorbable sutures**^Q.

- In **most cases (80%-90%)**, a **hernia sac** is **not present**. If **identified**, it is **excised** at the time of repair^Q.
- The advantage of a **prosthetic patch** is that a **tension-free repair** can be frequently obtained in **large defects**^Q.

2. Ans. b. Delay in emergent surgery (Ref: Nelson 18/e p748; Fundamentals of Pediatric Surgery (Springer) 2011/535,536)



3. Ans. c. Present in second decade

4. Ans. d. Transverse colon (Ref: Sabiston 19/e p1834-1836; Schwartz 9/e p1416-1418; Bailey 26/e p119, 25/e p84-85; Shackelford 7/e p506)

MORGAGNI HERNIAS (RETROSTERNAL HERNIAS OR LARREY'S HERNIA^Q)

- Congenital hernia of anteromedial, retrosternal diaphragm
- Occur in the triangular space between the muscle fibers that make up the diaphragm
- They extend from the xiphisternum and the costal margin to the central tendon of the diaphragm.
 - Ninety percent are right sided^Q because the pericardium itself prevents left-sided hernias
 - Superior epigastric vessels may pass through Morgagni space^Q
 - The most commonly involved viscus is the transverse colon^Q

Clinical Features

- Patients are usually asymptomatic^Q

Diagnosis

- Anterior mediastinal masses are found incidentally on chest radiographs^Q.

Treatment

- Prompt surgical repair after diagnosis is prudent to avoid incarceration or strangulation of abdominal organs.
- A transabdominal route^Q is the preferred choice.
- Prosthetic mesh is generally required to repair the defect^Q.

5. Ans. d. Diaphragmatic hernia

6. Ans. a. Early respiratory distress leading to early diagnosis and treatment are good prognostic sign

7. Ans. c. Always occurs on right side

8. Ans. a. Seen on right side

9. Ans. c. Peristalsis in the thoracic cavity

10. Ans. a. Congenital hernia

11. Ans. a. Right anterior

12. Ans. b. Abdominal distension

13. Ans. a. Hernia between the costal and sternal part of the diaphragm

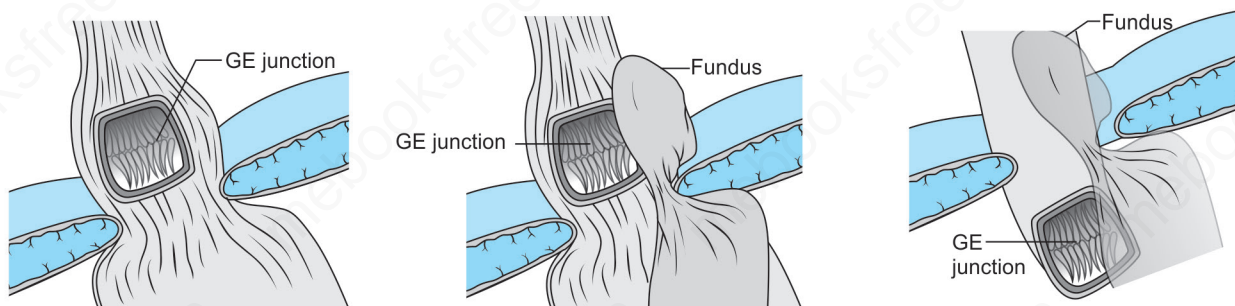
14. Ans. b. Diaphragmatic hernia

HIATUS HERNIA

15. Ans. a. Surgery is indicated in all symptomatic cases, b. Para-esophageal type is more complicated (Ref: Sabiston 19/e p1081-1083; Schwartz 10/e p980-984, 9/e p842-845; Bailey 26/e p1002-1003, 25/e p1024-1025; Shackelford 7/e p494-505)

Types of Hiatal hernia	
Type I	Sliding hiatal hernia (MC) ^Q
Type II	True paraesophageal hernia ^Q
Type III	Mixed paraesophageal hernia (I and II) ^Q
Type IV	Paraesophageal hernia containing other intraabdominal organs ^Q

Types of Hiatal Hernia



PATHOPHYSIOLOGY OF HIATUS HERNIA

Type I Hernia or sliding HH

- Characterized by **upward displacement** of the **GE junction** into the **posterior mediastinum**^Q.
- The **stomach** remains in its **usual longitudinal alignment**^Q.
- A **higher incidence of HH** has also been found in people with **inguinal hernias**^Q.
- **Majority** of patients with HH are **asymptomatic**^Q
- The **prevalence and size** of the sliding HH **correlate with increasing severity of reflux disease**^Q.

Type II Hernia

- **True PEH**: Defined by a **normally positioned intraabdominal GE junction** with **upward herniation** of the **stomach**^Q alongside it.
- A PEH develops when there is a **defect**, possibly **congenital**, in the **hiatus anterior** to the esophagus.
- **Persistent posterior fixation** of the **GE junction** is the essential difference between a PEH and a sliding HH.

Type III Hernia

- **Mixed hernia**: Characterized by **displacement** of **both the GE junction** and a **large portion** of the **stomach** cephalad into the posterior mediastinum^Q.
- Starts as a **sliding HH**, and over time as the **hiatus enlarges**, and more of **fundus** and **body** of the stomach **herniate** into the chest.

Type IV Hernia

- Esophageal hiatus has dilated to such an extent that the **hernia sac** also **contains** other organs such as the **spleen, colon, or small bowel**^Q.
- **Bowel obstruction and complications**^Q due to altered anatomy.

16. Ans. a. Esophagitis

17. Ans. b. Cardia goes through hiatus

18. Ans. a. Surgery when medical treatment has failed, b. Nissen's fundoplication (Ref: Sabiston 19/e p1081-1083; Schwartz 10/e p980-984, 9/e p842-845; Bailey 26/e p1002-1003, 25/e p1024-1025; Shackelford 7/e p494-505)

HIATUS HERNIA

- Greater than 95% of HHs is **type I or sliding hernias**^Q
- Of all PEHs, **type III** is the **most common**^Q
- PEHs are **more common** in **females** and have an **autosomal dominant** mode of transmission.
- **MC structure** to herniate is the **fundus** of the stomach; other structures that may be located in the hernia sac include the **spleen, colon, and omentum**^Q
- Type IV PEH has a higher incidence of **serious results**, with 50% of patients presenting **emergently**.

Clinical Features

- Most common preoperative symptom and finding is the **typical heartburn**^Q
- Others are **chest pain, epigastric pain, dysphagia**, postprandial fullness, **regurgitation**, vomiting, weight loss, anemia, and respiratory symptoms^Q.
- **Hematemesis** or **anemia** is evident in about a **third** of patients with PEH.

Diagnosis

- **Barium swallow** is the **most important diagnostic test**^Q.
- **Endoscopy** helps to identify **mucosal erosions** as a source of gastrointestinal blood loss.
- **Manometry** is needed to determine the **motor function** of the esophageal body.

Treatment

- Surgical approach: Transabdominal (laparoscopic or open) or transthoracic.
- **Transabdominal laparoscopic approach** for HH repair is **preferred**^Q

Cameron Ulcer or Riding Ulcer

- Bleeding can be caused by **ischemia** of the gastric mucosa or by **riding ulcers** or **Cameron's ulcers**^Q.
- **Cameron's ulcers** are due to the **constant abrasive force** as the stomach rubs against or is pinched by the diaphragmatic hiatus.
- The continuous movement of the stomach and esophagus as they travel up and down with respiration and swallowing compounds the problem.
- **Anemia** from a PEH resolves in **92%** of patients after **surgical repair**^Q.

19. Ans. d. Hiatus hernia

20. Ans. b. Barium meal (Ref: Bailey 26/e p1003, 25/e p1024, 24/e p1008)

DIAGNOSIS OF HIATUS HERNIA

- The **hernia** may be **visible on a plain radiograph** of the **chest** as a **gas bubble**, often with a **fluid level behind the heart**^Q.
- A **barium meal** is the **best method of diagnosis**^Q.
- The **endoscopic appearances** may be **confusing**, especially in **large hernias** when it is easy to become disorientated.

21. Ans. c. Barium meal upper GI in Trendelenburg position (Ref: Bailey 26/e p1003, 25/e p1024, 24/e p1008; <http://medical-dictionary.thefreedictionary.com/diaphragmatic+hernia>)

BARIUM STUDIES IN HIATAL HERNIA

- To facilitate visualization of the **hernia**, the **patient may be placed in a Trendelenburg position** during studies of **barium swallowing**^Q.

22. Ans. c. Include only the anterior stomach wall in the wrap (Ref: www.ncbi.nlm.nih.gov/pubmed/8313128)

Nissen's fundoplication	<ul style="list-style-type: none"> • Left crus approach to a 360-degree wrap (Nissen fundoplication), which is the procedure of choice for GERD. • Left crus approach: Direct and early view of the short gastric vessels and spleen^Q.
Rosetti and Hell modification of Nissen's fundoplication	<ul style="list-style-type: none"> • Include only anterior stomach wall in the wrap^Q. • The idea was to reduce dissection in the vicinity of vagus nerve.

23. Ans. a. Hiatus hernia

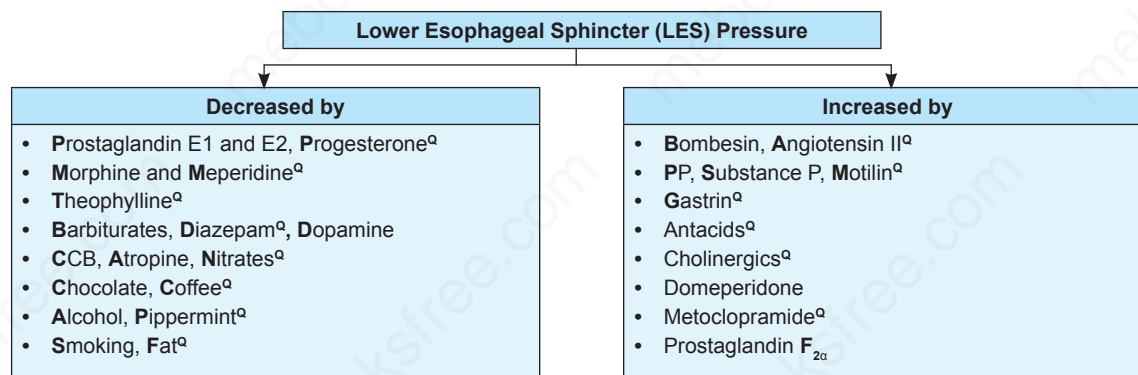
24. None: (Ref: Sabiston 19/e p1074-1077; Schwartz 10/e p980-984, 9/e p836-839; Bailey 26/e p999, 25/e p1021; Shackelford 7/e p237-239)

Type of Fundoplication	Degree of Wrap
Watson	• 90-degree anterior fundoplication ^Q
Dor	• 180-degree anterior fundoplication ^Q
Toupet	• 180-degree posterior fundoplication subsequently modified to a 270-degree wrap ^Q
Belsey Mark IV	• 270-degree anterior fundoplication ^Q
Nissen	• 360-degree fundoplication ^Q

25 Ans. a. Hiatus hernia

REFLUX ESOPHAGITIS

26. Ans. b. Protein (Ref: Shackelford 7/e p56)



- PMT BD CAN decrease LES pressure: Prostaglandin E1 and E2, Progesterone, Morphine and Meperidine, Theophylline, Barbiturates, Diazepam, Dopamine, CCB, Atropine, Nitrates
- CAPS Fat decrease LES pressure: Chocolate, Coffee, Alcohol, Peppermint, Smoking, Fat.
- PSM BAG increase LES pressure: PP, Substance P, Motilin, Bombesin, Angiotensin II, Gastrin

27. Ans. b. Gastrin

28. Ans. c. 24-hours pH monitoring (Ref: Sabiston 19/e p1067-1081; Schwartz 10/e p964-980, 9/e p827-841; Bailey 26/e p995-999, 25/e p1017-1024; Shackelford 7/e p174-180, 215-237)

GASTRO-ESOPHAGEAL REFLUX DISEASE (GERD)

- Classical triad of symptoms is retrosternal burning pain, epigastric pain and regurgitation^Q.
- GERD is associated with complications such as esophageal ulcerations (5%), peptic strictures (4-20%), and Barrett's esophagus (8-20%).

Pathophysiology

- LES has the primary role of preventing reflux into the esophagus.

Factors Contributing to the High-pressure Zone in the Lower Esophagus

- Intrinsic musculature^Q of the distal esophagus which are in a state of tonic contraction
 - Sling fibers of the cardia^Q which are at the same anatomic depth of the circular muscle fibers of the esophagus but are oriented in a different direction
 - Diaphragm^Q: during inspiration the anteroposterior diameter of the crural opening is decreased, compressing the esophagus and increasing the measured pressure at the LES
 - Transmitted pressure^Q of the abdominal cavity
- GERD is often associated with a hiatal hernia (MC type is type I or sliding hernia^Q).
 - A hiatal hernia is neither necessary nor sufficient to make the diagnosis of GERD, and the presence of such a hernia does not constitute an indication for operative correction^Q.
 - Many patients with hiatal hernias do not have symptoms and do not require treatment^Q.

Clinical Features

- Classical triad of symptoms is retrosternal burning pain, epigastric pain and regurgitation.
- MC presentation of GERD: Long-standing history of heartburn and a shorter history of regurgitation^Q.

- Symptoms of GERD: Heartburn (80%)^Q, Regurgitation (54%), Abdominal pain (29%), Cough (27%), Dysphagia for solids (23%), Belching (15%), Bloating (15%), Aspiration (14%), Wheezing (7%).

Diagnosis

- Endoscopy: Exclude other diseases, especially a tumor, and to document the presence of peptic esophageal injury. An essential step in the evaluation of GERD, who are being considered for operative intervention^Q.
 - Manometry: For information about the function of the esophageal body and LES^Q

24-hour pH Monitoring

- Gold standard for diagnosing and quantifying acid reflux is the 24-hour pH test^Q.
 - Information from the study: Total number of reflux episodes (pH<4), longest episode of reflux, number of episodes lasting >5 minutes, extent of reflux in the upright and supine position.
 - DeMeester score^Q: An overall score is obtained with the use of a formula that assigns a weight to each item according to its capacity to cause esophageal injury.
 - DeMeester score needs to be <14.7^Q.
- Esophagogram: For evaluation of symptoms of GERD when an operation is contemplated or when the symptoms do not respond as expected. Presence and size of a hiatal hernia may be characterized^Q.

Treatment

- Lifestyle modifications: Cessation of smoking, decreased caffeine intake, and avoidance of large meals before lying down^Q
- Medical Management: Double dose of PPI is the initial approach^Q
- Compared with H₂ blockers, PPIs are more effective at healing esophageal ulceration secondary to acid exposure.

Indications of Surgical Therapy

- Severe esophageal injury (ulcer, stricture, or Barrett's mucosa)^Q
 - Incomplete resolution of symptoms or relapses while on medical therapy
 - Long duration of symptoms^Q
 - Symptoms persist at a young age^Q
- Antireflux surgery: Laparoscopic Nissen's fundoplication is gold standard for GERD^Q.
- Patients who have >10 years of life expectancy and are in need of lifelong therapy due to a mechanically defective sphincter, surgical therapy may be considered the treatment of choice^Q.
- The principles of modern Nissen fundoplication include secure crural closure and creation of a short (≤2 cm), 360-degree "floppy" fundoplication designed to most closely replicate the normal physiology of the gastroesophageal flap valve^Q.

29. Ans. c. Gastroesophageal reflux disease

30. Ans. a. Respiratory symptoms (Ref: Nelson 18/e p1547)

Recurrent respiratory symptoms (Wheezing, stridor, chronic cough, apnea, aspiration) are the earliest indicators of pathological reflux among the options provided.

GERD IN INFANTS

- Most frequent complications of GERD in infants are failure to thrive and recurrent pulmonary symptoms^Q.
- Regurgitation alone does not indicate pathological reflux.
- Presence of upper GI bleed is an uncommon marker for pathological reflux or esophagitis.
- Presence of stricture esophagus is an uncommon and late complication of untreated pathological GERD.
- Recurrent pulmonary symptoms are frequent and early indicators of pathological GERD^Q.

31. Ans. d. 24-hours pH monitoring

32. Ans. b. Transient LES relaxation (Ref: Harrison 18/e p2433)

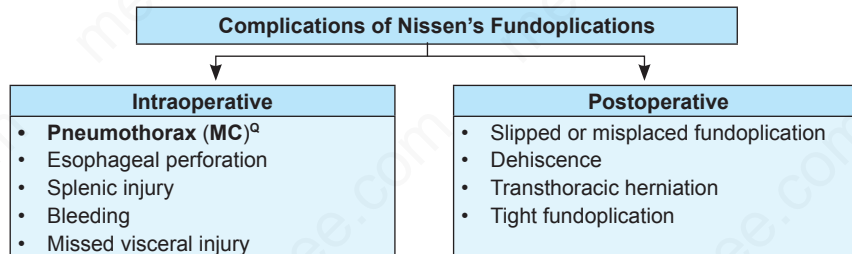
- Harrison says "Transient LES relaxations account for at least 90% of reflux in normal subjects or GERD patients without hiatus hernia^Q."

33. Ans. a. Barium swallow

- IOC for anatomical disorders of esophagus: Barium swallow^Q
- IOC for motility disorders of esophagus: Manometry^Q

34. Ans. d. Pneumothorax (Ref: Shackelford 7/e p234)

Pneumothorax (1-5%) is usually self-limited but may cause immediate or delayed hemodynamic or respiratory consequences. It is one of the most common complication of Nissen's fundoplication.



35. Ans. b. Watson is 90 degree posterior

36. Ans. a. Long intra-abdominal esophagus, b. Increased intra-abdominal pressure, c. Right crus of diaphragm

37. Ans. None
 38. Ans. a. Nitrates, c. Morphine, d. Atropine, e. Calcium channel blockers
 39. Ans. a. Alcohol, b. Caffeine/Tea, c. Diazepam
 40. Ans. c. Theophylline
 41. Ans. d. All of the above
 42. Ans. None
 43. Ans. d. All of above
 44. Ans. d. Esophageal reflux

ACHALASIA CARDIA

45. Ans. b. Body peristalsis is normal (Ref: Sabiston 19/e p1025-1028; Schwartz 10/e p990-992, 9/e p850-851, 857-860; Bailey 26/e p1014-1017, 25/e p1036-1038; Shackelford 7/e p349-352, 354-361)

ACHALASIA CARDIA

- Achalasia means "failure to relax^Q," (sphincter remains in a constant state of tone with periods of relaxation)
- Both the muscle of the esophagus and LES are affected^Q.
- Prevailing theory: Destruction of the nerves to LES is primary pathology and degeneration of neuromuscular function of the body of esophagus is secondary^Q.
- Premalignant condition leading to squamous cell carcinoma

- Triple A-syndrome or Allgroves disease^Q: Achalasia, Alacrima and ACTH-resistant Adrenal insufficiency.

Pathogenesis

- Progressive inflammation and selective loss of the inhibitory myenteric neurons in Auerbach's plexus of the esophagus that normally secrete VIP and nitric oxide^Q.
- This results in failure of relaxation of the LES and aperistalsis of the esophageal body with subsequent functional obstruction at the level of the GE junction and gradual dilatation of the esophagus^Q.

Clinical Features

- The classic triad of symptoms consists of dysphagia, regurgitation, and weight loss.
- Heartburn, postprandial choking, and nocturnal coughing are seen commonly.
- Men and women are equally affected, with no ethnic predisposition to the disease^Q.
- Regurgitation of undigested, foul-smelling foods is common, and with progressive disease, aspiration can become life-threatening^Q.
- Pneumonia, lung abscess, and bronchiectasis often result from long-standing achalasia.
- Dysphagia progresses slowly over years^Q.

Diagnosis

- Barium swallow:
 - Dilated esophagus with a distal narrowing^Q
 - "Bird's beak", "Pencil-tip" or "Rat's tail" appearance^Q
 - Sphincter spasm and delayed emptying through the LES
 - A lack of peristaltic waves in the body and failure of LES relaxation^Q
 - Lack of a gastric air bubble^Q on the upright portion is a result of the tight LES not allowing air to pass easily into the stomach.
 - Massive esophageal dilation, tortuosity, and a sigmoidal esophagus (megaesophagus) in advanced stage^Q
 - Mecholyl test is positive in Achalasia^Q
 - CCK test is positive in Achalasia^Q
- Manometry is gold standard test for diagnosis.
 - Absence of body peristalsis and poor LES relaxation is mandatory^Q for diagnosis.

Manometry Findings of Typical Achalasia

Abnormalities of LES	Abnormalities of esophageal body
<ul style="list-style-type: none"> Incomplete or absent LES relaxation^Q Elevated LES pressure^Q 	<ul style="list-style-type: none"> Elevated intraesophageal pressure^Q (pressurization of the esophagus) from incomplete air evacuation Simultaneous mirrored contractions with no evidence of progressive peristalsis^Q Low-amplitude waveforms^Q indicating a lack of muscular tone

Treatment

- Early stage: Sublingual nitroglycerin, nitrates, or calcium channel blockers^Q may offer hours of relief of chest pressure before or after a meal.
- Bougie dilation^Q up to 54 French may offer several months of relief but requires repeated dilations to be sustainable.

- **Barium swallow:**
 - **Corkscrew or rosary-bead esophagus, segmental spasm or pseudodiverticulosis appearance^Q**
 - Due to presence of **tertiary contractions^Q**
 - Indicative of **advanced disease^Q**

- **Manometry is gold standard test** for diagnosis^Q.
 - Classic manometry findings: **Simultaneous, multi peaked contractions** of **high amplitude** (>120 mm Hg) or **long duration** (>2.5 sec).
 - These **erratic contractions** occur after **more than 20%** of wet swallows.

Treatment

- **Mainstay of treatment** for DES is **nonsurgical**, and **pharmacologic** (Nitrates, calcium channel blockers) or **endoscopic intervention** (Bougie dilation) is preferred^Q.
- **Indications of surgery (long esophagomyotomy)**:
 - **Incapacitating chest pain** or **dysphagia** who have **failed medical** and **endoscopic therapy**^Q
 - Presence of a **pulsion diverticulum** of the thoracic esophagus

NUTCRACKER ESOPHAGUS

- **Hypermotility disorder** also known as **supersqueeze esophagus**^Q.
- Esophagus with **hypertensive peristalsis** or **high-amplitude peristaltic contractions**.
- **Most common and most painful** esophageal **hypermotility disorder**^Q.
- Associated with **hypertrophic musculature** resulting in high-amplitude contractions of the esophagus

Clinical Features

- **Chest pain** and **dysphagia** are typical symptoms.

Diagnosis

- The **gold standard of diagnosis** is the subjective complaint of **chest pain** with simultaneous objective evidence of **peristaltic esophageal contractions 2 standard deviations above the normal**^Q values on manometric tracings.
- On manometry, amplitude >180 mmHg and duration of contraction >6 seconds

Treatment

- The treatment of nutcracker esophagus is **medical** (Calcium channel blockers, nitrates, and antispasmodics)^Q

HYPERTENSIVE LES

- The LES pressure is **above normal**, motility of esophageal body may be **hyperperistaltic** or **normal**.

Clinical Features

- Patients with **hypertensive LES** present with **chest pain** or **dysphagia**^Q.

Diagnosis

- Diagnosis is made by **manometry**.
 - **Elevated LES pressure** (>26 mm Hg) and **normal relaxation** of the LES.
 - Esophageal body may be **hyperperistaltic** or **normal**.

Treatment

- **Botox injections** alleviate symptoms temporarily, and **hydrostatic balloon dilation** may provide long-term symptomatic relief.
- **Surgery** in patients who **fail interventional treatments** and those with **significant symptoms**.
- A **laparoscopic modified Heller esophagomyotomy** is the **operation of choice**.

68. Ans. d. Scleroderma, e. Cricopharyngeal carcinoma (Ref: Bailey 26/e p1017-1018, 25/e p1035; Sabiston 19/e p1025)

Classification of Esophageal Motility Disorders	
Disorders of the pharyngo-esophageal junction	<ul style="list-style-type: none"> • Neurological: Stroke, motor neuron disease, multiple sclerosis, Parkinson's disease • Myogenic: Myasthenia, muscular dystrophy • Pharyngo-esophageal (Zenker's) diverticulum
Disorders of the body of the esophagus	<ul style="list-style-type: none"> • Diffuse esophageal spasm • Nutcracker esophagus
Autoimmune disorders-Systemic sclerosis (CREST)	<ul style="list-style-type: none"> • Reflux associated • Idiopathic
Allergic	<ul style="list-style-type: none"> • Eosinophilic esophagitis • Non-specific esophageal dysmotility
Disorders of the lower esophageal sphincter	<ul style="list-style-type: none"> • Achalasia • Incompetent lower sphincter (i.e. GERD)

69. Ans. d. Achalasia cardia

ZENKER'S DIVERTICULUM

70. Ans. a. Barium swallow (Ref: Sabiston 19/e p1023-1024; Schwartz 10/e p989, 9/e p847-850; Bailey 26/e p1018, 25/e p1040-1041; Shackelford 7/e p336-346)

ZENKER'S OR PHARYNGO-ESOPHAGEAL DIVERTICULA

- **Mucosal outpouching (pulsion diverticulum)** occurring through the triangular bare area (**Kilian's triangle**)^Q, between the **upper oblique fibers (thyropharyngeus muscle)** and **lower horizontal fibers (cricopharyngeus muscle)** of the **inferior constrictor muscle**^Q

- **Increased intraluminal pressures** (secondary to **abnormal esophageal motility**)^Q pushes **mucosa and submucosa** through a muscular defect in the wall of the esophagus creating a **pulsion diverticulum**^Q
- It is a **pseudodiverticula**^Q
- It **arises posteriorly** in the midline of the neck, **mouth is in midline** but **sac projects laterally**^Q (usually left laterally)

- It is **not a true esophageal diverticula**^Q, as it arises above the upper esophageal sphincter (the cricopharyngeus sphincter)
- MC esophageal diverticula^Q

Pathology

- **Neuromuscular incoordination**^Q in this region
- May be due to **different nerve supply** of the **two parts of inferior constrictor muscle**^Q
 - The thyropharyngeus (oblique fibers) supplied by the pharyngeal plexus
 - Cricopharyngeus (horizontal fibers) by recurrent laryngeal nerve

Clinical features

- Usually seen in patients over **50 years**^Q
- MC symptom is **dysphagia**^Q
- **Undigested food is regurgitated into the mouth**, especially when the patient is in the **recumbent position**^Q
- Swelling of the neck, gurgling noise after eating, halitosis, and a sour metallic taste in the mouth are common symptoms
- **Cervical webs** are seen **associated in 50%**^Q of patients with Zenker's diverticula, can cause dysphagia post-operatively if not treated.

Diagnosis

- Barium swallow is **diagnostic**

Complications

- **Pneumonia and lung abscess** due to **aspiration**^Q (MC)
- Perforation, Bleeding
- Carcinoma

Management

- Surgical therapy (**Cricopharyngeal myotomy + Diverticulopexy**) is **treatment of choice**^Q

Treatment options for Zenker's diverticula

- **Cricopharyngeal myotomy**- a myotomy alone is sufficient for small diverticula
- **Myotomy with excision of sac**- done for large (>4 cm) diverticula
- **Diverticulopexy**
- **Diverticulo-esophagostomy** using a linear cutting staple gun
 - The septum between the esophagus and the diverticula is divided
 - Also known as **Dohlman procedure**^Q

71. Ans. b. Zenker's diverticulum 72. Ans. b. Feeling of obstruction in esophagus
73. Ans. d. Out pouching of the anterior pharyngeal wall just above the cricopharyngeus muscle
74. Ans. b. Zenker's diverticulum 75. Ans. c. Treatment is simple excision
76. Ans. c. Lung abscess 77. Ans. a. Zenker's diverticulum
78. Ans. a. The two parts of inferior constrictor muscle of the pharynx

MIDESOPHAGEAL OR TRACTION DIVERTICULA

- **Inflammation of the lymph nodes** exerts **traction** on the wall of the esophagus leading to the formation of a **true diverticulum** in the midesophagus.

- Caused by **inflamed mediastinal lymph nodes** from **tuberculosis, histoplasmosis**^Q and resultant fibrosing mediastinitis.

- Typically present on the **right** owing to the overabundance of structures in the midthoracic region of the left chest and **wide mouthed**.

Clinical Features

- Most patients are **asymptomatic**, incidentally found during a workup for some other complaint.
- **Dysphagia**, **chest pain**, and **regurgitation** can be present and are usually indicative of an **underlying primary motility disorder**.

Diagnosis

- Investigation of choice is **barium swallow**^Q (**lateral views** to determine side)
- CT scan is helpful to identify any **mediastinal lymphadenopathy** and may help to **lateralize the sac**.
- **Manometry** in all patients, symptomatic or not, to **identify a primary motor disorder**.

Treatment

- In **asymptomatic patients** who have inflamed mediastinal lymph nodes from **tuberculosis** or **histoplasmosis**: **ATT** or **antifungal agents**^Q
- **Diverticulopexy** for **symptomatic** or **2 cm or larger diverticulum**
- **Esophagomyotomy** in **severe chest pain** or **dysphagia** and a **documented motor abnormality**^Q

EPIPHRENIC DIVERTICULA

- Epiphrenic diverticula are found **adjacent to diaphragm** in the **distal third** of the esophagus, within 10 cm of the GEJ.
- Most often related to **thickened distal esophageal musculature** or **increased intraluminal pressure**.
- **Pulsion** or **false diverticula**, often associated with **DES**, **achalasia**, and **most commonly NEM** (non-specific esophageal motility disorders).
- In patients in whom a motility abnormality cannot be identified, a congenital (**Ehlers-Danlos syndrome**) or **traumatic cause** is considered.
- More common on the **right side** and tend to be **wide-mouthed**^Q.

Clinical Features

- Most patients are **asymptomatic**.
- **Dysphagia** or **chest pain** indicative of a **motility disturbance**.
- The diagnosis is often made during the workup for a motility disorder, and the diverticulum is **found incidentally**.

Diagnosis

- Investigation of choice is **barium swallow** (**lateral views** to determine side)
- **Manometry** to identify a **primary motor disorder**.

Treatment

- **Diverticulopexy**
- **Long esophagomyotomy** in **severe chest pain**, **dysphagia**, or a **documented motor abnormality**

Killian-Jamieson Diverticula

- **Lateral cervical** esophageal diverticula
- Located **just below cricopharyngeus**
- Mostly **asymptomatic**

79. Ans. d. Zenker's diverticulum

SCLERODERMA

80. Ans. b. Esophageal atresia (Ref: Harrison 18/e p943)

CROW-FUKASE SYNDROME

- The features of this syndrome are highlighted by an acronym: **POEMS**^Q
- **POEMS**^Q: **P**olyneuropathy, **O**rganomegaly, **E**ndocrinopathy, **M**-protein, **S**kin changes.

81. Ans. b. Polyneuropathy, c. Endocrinopathy, d. M-protein

82. Ans. c. Lower third (Ref: Harrison 18/e p2437; Schwartz 10/e p984-985, 9/e p846-847)

SCLERODERMA

- Systemic disease accompanied by **esophageal abnormalities** in 80% of patients.
- In most, the disease follows a **prolonged course**^Q.
- **Renal involvement** occurs in a small percentage of patients and signals a **poor prognosis**.
- The onset of the disease is usually in the **third** or **fourth decade** of life
- Occurring twice as frequently in **women**^Q as in men.

Pathophysiology

- In the GI tract, the predominant feature is **smooth muscle atrophy**^Q.

Smooth muscle atrophy in lower two third of esophagus → Incompetent LES → GERD → Stricture^Q

- Normal peristalsis** in the **proximal striated esophagus**, with **absent peristalsis** in the **distal smooth muscle portion**^Q.
- The **LES pressure** is **progressively weakened** as the disease advances.
- Gastroesophageal reflux** commonly occurs in patients with scleroderma, because they have both **hypotensive sphincters** and **poor esophageal clearance**.
- This combined defect can lead to **severe esophagitis** and **stricture formation**^Q.

Clinical Features

- Dysphagia** and **GERD**
- Postural dysphagia** for **liquids**: Dysphagia for liquids in **recumbent position**, not in upright position
- Dysphagia for solids is unrelated to posture

Diagnosis

- Manometry**:
 - Normal peristalsis** in the **proximal striated esophagus**, with **absent peristalsis** in the distal smooth muscle portion
 - LES pressure** is **decreased** but **sphincter relaxation** to deglutition is **normal**

Barium Swallow: Dilated, barium-filled **esophagus**, **stomach**, and **duodenum**, or a **hiatal hernia** with **distal esophageal stricture** and **proximal dilatation**^Q.

Treatment

- PPIs, antacids, elevation of the head of the bed, and multiple dilations for strictures for reflux
- Esophageal shortening** may require a **Collis gastroplasty** in combination with a **partial fundoplication**^Q.

Surgery reduces **esophageal acid exposure**, but **does not return it to normal** because of the **poor clearance function** of the **body of the esophagus**^Q.

83. Ans. b. Scleroderma

PLUMMER-VINSON SYNDROME

84. Ans. a. Lower esophageal web, c. Common in adult female (Ref: Sabiston 19/e p802, 1051; Bailey 26/e p1021-1022, 25/e p737, 1043)

PLUMMER-VINSON SYNDROME

- Also known as **Paterson-Brown Kelly syndrome**
- Occurs in **middle aged edentulous** (without teeth) **women**^Q.
- Premalignant lesion**^Q (Approximately 10% of patients develop **SCC** of **esophagus**, **oral cavity** or the **hypopharynx**)
- Iron-deficiency anemia** is a common finding (known as **sideropenic dysphagia**^Q)

Plummer-vinson Syndrome is Characterized by

- Dysphagia** due to **upper esophageal web**^Q
- Chronic iron deficiency anemia**^Q
- Atrophic oral mucosa** and **glossitis**^Q
- Brittle, spoon-shaped fingernails (Koilonychia)**^Q
- Splenomegaly**^Q
- Achlorhydria**^Q

- Cause of **dysphagia** is usually a **cervical esophageal web**^Q (**Post-cricoid web**) but abnormal pharyngeal and esophageal motility may play a role.

Treatment

- Gentle dilatation**, **iron therapy** and **vitamins**
- Esophageal web** in Plummer-vinson syndrome is found at **upper end** of esophagus^Q
- Schatzki's ring** is found at the **lower end** of esophagus^Q.

85. Ans. a. Post cricoids region commonly involved in web formation

86. Ans. a. Occurs in elderly males

88. Ans. c. Post cricoid webs

90. Ans. a. Web present in lower part of esophagus

87. Ans. c. It occurs exclusively in men

89. Ans. c. Achalasia

BARRETT'S ESOPHAGUS

91. Ans. a. Long esophageal segment involved, b. Metaplasia, c. Peptic ulcer, e. Leads to adenocarcinoma (Ref: Sabiston 19/e p1033-1036; Schwartz 10/e p967,969,979, 9/e p831-832; Bailey 26/e p1000-1002, 25/e p1022-1024; Shackelford 7/e p285, 294)

BARRETT'S ESOPHAGUS

- Metaplasia of esophageal squamous epithelium into columnar in distal^Q esophagus
- It is consequence of severe reflux esophagitis^Q
- MC type of columnar epithelium is intestinal metaplasia^Q
- Metaplasia of esophageal squamous epithelium into columnar in distal^Q esophagus
- It is consequence of severe reflux esophagitis^Q
- MC type of columnar epithelium is intestinal epithelium (Intestinal metaplasia^Q)
- Barrett's esophagus requires both endoscopically visible segment of columnar lining of distal esophagus and intestinal metaplasia showing goblet cells on biopsy

Columnar Epithelium in Barrett's Esophagus

- Intestinal type^Q: MC type, most commonly associated with dysplasia and carcinoma
- Junctional type
- Fundic type

- Metaplasia characteristically affects distal esophagus^Q
- More common in men, whites and with increasing age^Q
- Premalignant condition for adenocarcinoma^Q

Complications of Barrett's Esophagus

- Can lead to chronic peptic ulceration of esophagus (Barrett's ulcer)^Q
- Can lead to high (midesophageal) and long strictures^Q.

92. Ans. a. Endoscopic biopsy every 2 years
 93. Ans. a. Lower esophagus lined by columnar epithelium
 94. Ans. b. Intestinal metaplasia
 95. Ans. a. Stricture, c. Peptic ulcer
 96. Ans. a. Premalignant, c. Can be diagnosed by endoscopy, d. Biopsy is necessary to diagnose, e. Stricture may be present in high esophagus
 97. Ans. b. Premalignant condition
 98. Ans. d. Reflux esophagitis

CARCINOMA ESOPHAGUS PREDISPOSING FACTORS

99. Ans. d. Ectodermal dysplasia (Ref: Sabiston 19/e p1049-1052; Schwartz 10/e p1003-1014, 9/e p862-863; Bailey 26/e p1005-1006, 25/e p1026-1027; Shackelford 7/e p375-380)

Predisposing Factors for Carcinoma Esophagus	
Squamous Cell Carcinoma	Adenocarcinoma
<ul style="list-style-type: none"> • Alcohol^Q • Smoking^Q • Ingested carcinogens: <ul style="list-style-type: none"> - Nitrates^Q, nitrites, nitrosamines^Q - Smoked opiates^Q - Fungal toxins in pickled vegetables • Mucosal damage: <ul style="list-style-type: none"> - Chronic Achalasia^Q - Lye (caustic) ingestion - Long term ingestion of hot liquids - Radiation induced strictures^Q • Plummer vinson syndrome^Q • Tylosis palmaris et plantaris^Q: Congenital Hyperkeratosis^Q and pitting of palms and soles^Q • Human papilloma virus^Q • Esophageal diverticula^Q • Bulimia^Q • Deficiency: Vitamin A, zinc, molybdenum 	<ul style="list-style-type: none"> • GERD (leading to Barrett's esophagus^Q) • Obesity^Q • Scleroderma^Q <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Scleroderma: Smooth muscle atrophy in lower 2/3rd of esophagus → Incompetent LES → GERD → Stricture</p> </div> <ul style="list-style-type: none"> • Diet deficient in fruits and vegetables • Diet high in animal protein and cholesterol^Q

100. Ans. b. Barrett's esophagus
 101. Ans. a. Tylosis, b. Plummer-Vinson syndrome, c. Barrett's esophagus, d. Achalasia cardia, e. Scleroderma
 102. Ans. a. Tobacco/Alcohol, b. Alkalies
 103. Ans. c. Mediastinal fibrosis
 104. Ans. a. Barrett's esophagus
 105. Ans. None
 106. Ans. a. Tylosis, b. Smoking, c. Lye stricture, d. Reflux esophagitis
 107. Ans. c. Mediastinal fibrosis
 108. Ans. d. Nutcrackers esophagus
 109. Ans. a. H. pylori

H. PYLORI

- CAG-A positive strain is protective for adenocarcinoma esophagus but can lead to SCC of esophagus^Q.

110. Ans. b. Scleroderma
 111. Ans. a. Barrett's esophagus

CA ESOPHAGUS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

112. Ans. a. TNM stage (Ref: Sabiston 19/e p1049-1064; Schwartz 10/e p1003-1014, 9/e p862-870; Bailey 26/e p1004-1013, 25/e p1026-1035; Shackelford 7/e p416-434)

Long-term survival following esophagectomy depends on a number of factors such as the **depth of tumor invasion (T)**, the **number of involved lymph nodes (N)**, and on the **location** of the tumor in the esophagus.

CARCINOMA ESOPHAGUS

- MC esophageal cancer worldwide: Squamous cell carcinoma^Q
- MC esophageal cancer in United States (Western countries): Adenocarcinoma^Q
- More common in males^Q
- MC site of CA esophagus: Middle 1/3rd (Overall)^Q
- Chemotherapy regimen: Epirubicin + Cisplatin^Q + 5-FU

Squamous cell carcinoma	Adenocarcinoma
<ul style="list-style-type: none"> • Rarely seen before the age of 30 years • Highest mortality rates seen in men between 60-70 years^Q of age. • Predominantly affects African American men^Q • MC site: Middle 1/3rd^Q • Obesity is protective • H. pylori CAG-A strain is a risk factor^Q • Usually appears as an exophytic lesion with a large fungating mass^Q • More sensitive to chemoradiotherapy^Q • Treated aggressively with nonsurgical therapy^Q 	<ul style="list-style-type: none"> • Seen infrequently before the age of 40 years • Increases in incidence with age^Q • Disease affecting white men^Q • Barrett's esophagus: 40-fold^Q increased risk for adenocarcinoma • MC site: Lower 1/3rd^Q • Obesity is a risk factor • H. pylori CAG-A strain is a protective • Polypoid (5-10%), flat (10-15%), fungating (20-25%), or infiltrative (40-50%)^Q • Not as sensitive to chemoradiotherapy • Treated by a more aggressive surgical approach^Q.

Pathology

- Esophageal cancer asserts **aggressive biologic behavior**.
- With **only two layers** to the esophageal wall, tumors **rapidly infiltrate through the muscular wall into surrounding structures^Q**.
- The **rich vascular and lymphatic supply facilitates spread to regional lymph nodes^Q**.

Clinical Features

- Early-stage cancers: Asymptomatic or mimic symptoms of GERD.

- MC symptom: Dysphagia > Weight loss^Q

- Most patients with esophageal cancer **present with dysphagia and weight loss**, symptoms that usually indicate advanced disease.
- **Choking, coughing, and aspiration** from a **tracheoesophageal fistula** (In advanced cases)^Q
- **Hoarseness and vocal cord paralysis** from **direct invasion into the recurrent laryngeal nerve** (In advanced cases)^Q
- MC site of metastasis: Liver^Q > lung > bone
- Paraneoplastic manifestation associated with adenocarcinoma: Motor Neuropathy^Q

Diagnosis

- Barium swallow: First investigation done^Q in suspected case of CA esophagus (classic finding of an **apple core lesion^Q**)

- Endoscopy with biopsy: Investigation of choice for diagnosis of CA esophagus^Q.
- Endoscopic Ultrasound: Investigation of choice for staging of CA esophagus, best for T staging and LN metastasis^Q.

- CECT (abdomen and chest): Assess the length of the tumor, thickness of the esophagus and stomach, **regional LN status** and **metastasis to liver and lungs^Q**.

Treatment of CA Esophagus	
High grade dysplasia (Tis) or T1a	• Endoscopic Mucosal Resection ^Q
Localized Esophageal Cancer	• T1: Vagal sparing or transhiatal or minimal invasive esophagectomy with limited LN dissection ^Q • T2 and T3: Neo-adjuvant chemoradiation + Surgery ^Q • Cervical SCC or Non-ideal candidate for resection: Definitive chemoradiation ^Q
Locally Advanced Cancer	• Chemoradiation ^Q (± Surgical resection in T4a)
Metastatic Disease	• Definitive chemoradiation ^Q (for involved distant LN or metastatic disease)
Malignant TEF	• Coated SEMS ^Q (self expanding metallic stents)

- Post-operative chemoradiation is reserved for GE junction tumors^Q
- Extent of Resection: An in-situ margin of 10 cm^Q should be the goal

Prognosis

Long-term Survival Following Esophagectomy Depends on
<ul style="list-style-type: none"> – Depth of tumor invasion (T)^Q – Number of involved lymph nodes (N)^Q – Location^Q of the tumor in the esophagus

- Prognosis is better for tumors of the cervical esophagus and tumors located at GE junction^Q, in comparison to tumors located in the thoracic esophagus.

7 th AJCC: TNM Classification of Carcinoma of the Esophagus	
Tis: High-grade dysplasia	N1: Metastasis in 1-2 regional LNs
T1a: Tumor invades lamina propria, muscularis mucosa	N2: Metastasis in 3-6 regional LNs
T1b: Tumor invades submucosa	N3: Metastasis in 7 or more regional LNs
T2: Tumor invades muscularis propria	
T3: Tumor invades adventitia	M1: Distant metastasis
T4a: Resectable tumor invading pleura, pericardium, or diaphragm	
T4b: Unresectable tumor invading VAT (vertebral body, aorta, trachea)	

Stage Grouping					
Squamous Cell Carcinoma					
Stage	T	N	M	Grade	Location
0	Tis (HGD)	N0	M0	1, X	Any
IA	T1	N0	M0	1, X	Any
IB	T1	N0	M0	2-3	Any
	T2-3	N0	M0	1, X	Lower, X
IIA	T2-3	N0	M0	1, X	Upper, middle
	T2-3	N0	M0	2-3	Lower, X
IIB	T2-3	N0	M0	2-3	Upper, middle
	T1-2	N1	M0	Any	Any
IIIA	T1-2	N2	M0	Any	Any
	T3	N1	M0	Any	Any
	T4a	N0	M0	Any	Any
IIIB	T3	N2	M0	Any	Any
IIIC	T4a	N1-2	M0	Any	Any
	T4b	Any	M0	Any	Any
	Any	N3	M0	Any	Any
IV	Any	Any	M1	Any	Any

Stage Grouping				
Adenocarcinoma				
Stage	T	N	M	Grade
0	Tis (HGD)	N0	M0	1, X
IA	T1	N0	M0	1-2, X
IB	T1	N0	M0	3
	T2	N0	M0	1-2, X
IIA	T2	N0	M0	3
IIB	T3	N0	M0	Any
	T1-2	N1	M0	Any
IIIA	T1-2	N2	M0	Any
	T3	N1	M0	Any
	T4a	N0	M0	Any
IIIB	T3	N2	M0	Any
IIIC	T4a	N1-2	M0	Any
	T4b	Any	M0	Any
	Any	N3	M0	Any
IV	Any	Any	M1	Any

113. Ans. a. Polypoidal (Ref: Sabiston 19/e p 1054)

CARCINOMA ESOPHAGUS

- The 5-year survival rate varies but can be as good as 70% with polypoid lesions and as poor as 15% with advanced tumors.

114. Ans. c. GE junction tumors (Ref: Shackelford 7/e p397)

Siewert ^a classification GE junction tumors	
Type I	Cancer associated with Barrett's esophagus or true esophageal carcinoma growing down to the GE junction ^a
Type II	Tumor at the true junction^a (within 2 cm of the squamocolumnar junction)
Type III	Tumors of the subcardial region^a

115. Ans. a. Endoscopic mucosal resection (Ref: Sabiston 19/e p1053, 1063)

- Treatment of choice for high grade dysplasia (carcinoma in-situ or Tis) is endoscopic mucosal resection^a.

116. Ans. c. Hyperechogenic (Ref: Shackelford 7/e p420-421)

Features of Malignant Lymph Nodes on EUS
<ul style="list-style-type: none"> Echo-poor (hypoechoic)^a structure Sharply demarcated borders^a Rounded contour^a Size >1 cm^a

117. Ans. a. 5-FU + Cisplatin

118. Ans. a. EMR (Ref: Shackelford 7/e p438-448)

Palliation Therapy in Carcinoma Esophagus	
<ul style="list-style-type: none"> Laser Therapy^a Photodynamic Therapy^a 	<ul style="list-style-type: none"> Radiation Therapy^a SEMS^a

119. Ans. a. EUS

120. Ans. b. Middle 1/3rd (Ref: Shackelford 7/e p417)

- MC site of SCC of esophagus: Middle 1/3rd^a
- MC site of adenocarcinoma of esophagus: Lower 1/3rd^a
- MC site of carcinoma esophagus: Middle 1/3rd (overall)^a

121. Ans. b. Pencil tip deformity (Ref: *Surgical radiology Clinical Cases by Prabhakar Fajiah* (2007)/113)

Features of CA Esophagus on Barium Swallow	
<ul style="list-style-type: none"> • Mucosal irregularity and shouldering^Q • Narrowing^Q of the lumen • Irregular “rat-tail” filling defect^Q of the distal esophagus with shouldered edge^Q 	<ul style="list-style-type: none"> • Annular stricture^Q • Sharp and clear cut edge of filling defect^Q • Proximal dilatation^Q of the esophagus

- “Bird’s beak”, “Pencil-tip” or “Rat’s tail” appearance is seen in Achalasia^Q.

122. Ans. a. Middle 1/3rd

123. Ans. b. Middle 1/3rd

124. Ans. a. Barium studies (Ref: *Sabiston 19/e p1052-1053; Schwartz 10/e p1003-1014, 9/e p864-865; Bailey 26/e p1007-1008, 25/e p1028-1029; Shackelford 7/e p420*)

CARCINOMA ESOPHAGUS

- Barium swallow is the first investigation for an esophageal disease^Q presenting with dysphagia (it can show irregular filling defect with or without proximal dilatation, annular lesion appear as constricting bands)

Barium Swallow
<ul style="list-style-type: none"> • A barium swallow is recommended for any patient presenting with dysphagia. • The esophagram gives an overview of anatomy and function^Q. • It is able to differentiate intraluminal from intramural lesions and to discriminate between intrinsic (from a mass protruding into the lumen) and extrinsic (from compression of a structures outside the esophagus) compression. • The classic finding of an apple-core lesion in patients with esophageal cancer is recognized easily^Q

- Endoscopy and biopsy is the investigation of choice for CA esophagus^Q.
- For adequate assessment, both barium swallow and endoscopy are required^Q.

125. Ans. d. EUS can accurately stage the disease

126. Ans. a. Esophagectomy

127. Ans. a. Depth of tumor

128. Ans. b. Barium swallow + endoscopy

129. Ans. a. Migration (Ref: *Sabiston 19/e p1064; Schwartz 9/e p866; Bailey 26/e p1013, 25/e p1035; Shackelford 7/e p439-442*)

SELF-EXPANDING METALLIC STENTS (SEMS) IN MALIGNANT TRACHEO-ESOPHAGEAL FISTULA

- SEMS are relatively easy to insert under fluoroscopic guidance with a technical success rate of 95% and efficacy of 85-100% in relieving dysphagia.

- The duration of response is 5-6 months^Q and complications occur in 10-15% patients, the most common being stent migration and tumor ingrowth.
- The use of stents coated with silicone or polyurethane may prevent or delay tumor ingrowth and subsequent esophageal obstruction.
- Coated stents have been used with good success (>90%) for the treatment of tracheo-esophageal fistula^Q.

- Tumor ingrowth may be addressed by insertion of another stent or by tumor ablation.
- Placement of stents through proximally located tumors, especially those near the cricopharyngeus, is often not well tolerated.
- Stents placed across GE junction have a greater tendency to migrate and may result in symptomatic acid reflux^Q.
- Fixed diameter plastic endoluminal prostheses, associated with significant morbidity and mortality and low rate of dysphagia relief, have largely been abandoned^Q.

130. Ans. b. EUS (Ref: *Sabiston 19/e p1052-1053; Schwartz 10/e p1003-1014, 9/e p865-866; Bailey 26/e p1007-1009, 25/e p1028-1031; Shackelford 7/e p420-421*)

CARCINOMA ESOPHAGUS

- Endoscopic ultrasound (EUS) is the best diagnostic tool available to assess the locoregional extent of disease (T and N Staging)^Q
- The depth of tumor penetration of the esophageal wall and the presence of lymph node involvement can be assessed with an ultrasound probe attached to the tip of a flexible endoscope^Q.
- CT is generally considered to be less accurate in determining lymph node involvement than other modalities such as EUS^Q.

131. Ans. c. Endoprosthesis

132. Ans. b. Middle third

133. Ans. a. MC in middle 1/3rd, b. Adenocarcinoma is common variety, c. Carcinoma develops at the achalasia segment, d. Smoking is a risk factor, e. Endoscopy is the investigation of choice

134. Ans. a. Achalasia cardia

135. Ans. d. Pernicious anemia often present

136. Ans. d. Chemoradiation followed by palliative en-bloc resection

137. Ans. a. Adenocarcinoma is on the rise, b. Surgery is best treatment, c. Hoarseness of voice occurs in late cases
 138. Ans. b. Radiotherapy
 139. Ans. a. Abdomen-Neck (Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009-1012, 1011-1012, 9/e p868; Bailey 25/e p1034; Shackelford 7/e p429-430)

ORRINGER TRANSHIATAL ESOPHAGECTOMY

- Double incision: Midline laparotomy followed by cervical incision^Q
- Cervical anastomosis is done^Q
- MC procedure done for carcinoma esophagus^Q

140. Ans. b. Both adeno and squamous cell carcinoma occur 141. Ans. b. Endoscopic ultrasound
 142. Ans. b. Transesophageal USG 143. Ans. None
 144. Ans. a. Gastrostomy for palliation

- A gastric pull-up in the posterior mediastinal position has the best functional result, and every effort is made to preserve and use this successful combination.

145. Ans. a. Cisplatin
 146. Ans. c. T stage

ESOPHAGECTOMY

147. Ans. a. Right gastric and right gastroepiploic artery (Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p868-869; Bailey 26/e p1011-1012, 25/e p1032-1034; Shackelford 7/e p518-520)

REPLACEMENT CONDUITS AFTER ESOPHAGECTOMY

- Best conduit after esophagectomy (overall): Stomach^Q
- Conduit of choice after esophagectomy in CA esophagus: Stomach^Q
- Conduit of choice after esophagectomy in benign disorders (caustic injuries, acid-peptic disease), unhealthy stomach: Colon^Q
- Conduit of choice for short segment replacement: Jejunum^Q

Routes of Replacement of Esophagus

- Posterior mediastinum^Q through the bed of the resected esophagus
- Anterior mediastinal in the retrosternal^Q position
- Lateral traspleural placement behind the lung root^Q
- Antethoracic or presternal subcutaneous route^Q
- Gastric conduit is based on right gastric and right gastroepiploic vessels^Q
- Left colon is based on left colic artery (Branch of IMA), placed in isoperistaltic direction.
- Posterior mediastinal route is preferred (shortest route)^Q

148. Ans. a. Stomach
 149. Ans. c. Torek (Ref: Shackelford 7/e p416)
 • First successful esophagectomy was done by Torek.
 150. Ans. b. Middle 1/3rd (Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p868-869; Bailey 26/e p1011-1012, 25/e p1032-1034; Shackelford 7/e p427-430)

Types of Esophagectomy

<u>Types of Esophagectomy</u>	
Ivor-Lewis	<ul style="list-style-type: none"> • Transthoracic esophagectomy^Q • Double incision: Midline laparotomy followed by right sided thoracotomy^Q • Done for tumors of middle 1/3rd of esophagus^Q
Orringer	<ul style="list-style-type: none"> • Transhiatal esophagectomy^Q • Double incision: Midline laparotomy followed by Cervical incision^Q • MC procedure done for carcinoma esophagus^Q
McKeon	<ul style="list-style-type: none"> • En-bloc esophagectomy^Q • Three incisions: Right sided thoracotomy, followed by midline^Q laparotomy, followed by cervical incision^Q • Associated with maximum morbidity and mortality^Q

TUMOR MARGIN FOR CURATIVE EXCISION

- In GI malignancies (stomach^Q, small intestine^Q, colon^Q and proximal rectum^Q), tumor margin for curative excision is 5cm^Q except:
 - Esophagus: 10 cm^Q
 - Distal rectum: 2 cm^Q

Lymphadenectomy in CA Esophagus

One field lymphadenectomy	Removal of the intra-abdominal nodes (draining the proximal stomach and distal esophagus) ^Q
Two-field lymphadenectomy	Removal of the intra-abdominal + Intrathoracic nodes ^Q
Three-field lymphadenectomy	Removal of the intra-abdominal + Intrathoracic + Cervical LN ^Q

151. Ans. a. Transhiatal

152. Ans. b. Stomach

153. Ans. b. Anastomotic leak (Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p869; Shackelford 7/e p538-545)

Anastomotic leak following Ivor Lewis esophagectomy is a feared complication that in the past was associated with a 50% mortality rate. The anastomosis is intrathoracic, leak cause severe mediastinitis.

Complications of Esophagectomy

- | | |
|---|--|
| <ul style="list-style-type: none"> Anastomotic Leak (MC)^Q Anastomotic stricture Pulmonary complications | <ul style="list-style-type: none"> Recurrent laryngeal nerve palsy Chylothorax |
|---|--|

ANASTOMOTIC LEAK AFTER ESOPHAGECTOMY

- Incidence of anastomotic leak is higher following cervical anastomosis (10-15%) than intrathoracic anastomosis (5-10%).
- Although leak is more common following cervical anastomosis, it is rarely life-threatening^Q.
- Anastomotic leak following Ivor Lewis esophagectomy is a feared complication that in the past was associated with a 50% mortality rate^Q.
- Confirmation is usually possible by Gastrografin swallow^Q or instillation of contrast through the nasogastric tube.
- Immediate intervention is required, and attempts at direct repair with muscle flap reinforcement and wide drainage are often successful^Q.
- Patients who are unstable or severely ill should be diverted with a spit fistula, and either excluded at the hiatus, or have the conduit closed and returned to the abdomen^Q.
- Pulmonary complications are the MC cause of postoperative morbidity and mortality in transhiatal esophagectomy^Q

154. Ans. b. Transhiatal esophagectomy

155. Ans. a. Stomach

156. Ans. a. Right gastroepiploic artery, b. Right gastric artery

LEIOMYOMA

157. Ans. a. Leiomyoma (Ref: Sabiston 19/e p1047-1048; Schwartz 10/e p1216, 9/e p874; Bailey 26/e p1004, 25/e p1025; Shackelford 7/e p465-469)

LEIOMYOMA

- Leiomyoma is MC benign esophageal tumor^Q.
- The average age 4th-5th decades, more common in males^Q.
- Originate in smooth muscle, 90% are located in lower two thirds of the esophagus.
- Usually solitary and typically oval.^Q
- They remain intramural, having the bulk of their mass protruding toward the outer wall
- The overlying mucosa is freely movable and normal in appearance^Q.

Clinical Features

- Many leiomyomas are asymptomatic. Dysphagia and pain are MC symptoms^Q.
- Location and size tend not to correlate consistently with symptoms

Diagnosis

- Barium swallow is IOC for leiomyoma (classical, smooth, contoured, punched-out defect)^Q

- Endoscopy: Freely movable mass, which bulges into the lumen,
- Should not be biopsied because of an increased chance of mucosal perforation at the time of surgical enucleation^Q.

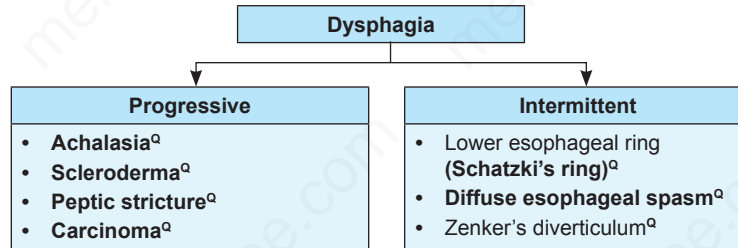
Treatment

- Enucleation is TOC for leiomyoma^Q.

158. Ans. c. Perforation

DYSPHAGIA

159. Ans. b. Reflux esophagitis, d. Pharyngeal diverticulum, e. Diffuse esophageal spasm (Ref: Sabiston 19/e p344, 1069; Schwartz 10/e p625, 9/e p827, 863)



160. Ans. a. CXR, b. Ba swallow, c. Endoscopy, d. USG, e. CT Scan

The clinical history is suggestive of carcinoma esophagus. All of the given investigations are used for the complete work-up.

161. Ans. b. Endoscopy

162. Ans. b. Herpes esophagitis, c. Monilial esophagitis (Ref: Harrison 18/e p2436; 16/e p218; Bailey 26/e p1041, 25/e p1041)

If odynophagia is present, candidal (monilial) or herpes esophagitis or pill induced esophagitis should be suspected.

ODYNOPHAGIA

- Odynophagia means **painful swallowing** seen in **inflammatory lesions** of food passage (i.e. oral cavity, pharynx and esophagus)
- Causes:
 - Candidal (monilial) esophagitis^Q
 - Herpes esophagitis^Q
 - Pill induced esophagitis^Q

163. Ans. c. Achalasia cardia

Presence of dysphagia to both solids and liquids suggests the diagnosis of achalasia.

Functional grades of Dysphagia	
Grade	Definition
I	Eating normally ^Q
II	Requires liquids with meals ^Q
III	Able to take semisolids but unable to take any solid foods ^Q
IV	Able to take liquids only
V	Unable to take liquids ^Q , but able to swallow saliva
VI	Unable to swallow saliva ^Q

DYSPHAGIA LUSORIA

164. Ans. a. Abnormal elongation of arch of aorta (Ref: Sabiston 19/e p1036-1037; Bailey 25/e p1043-1044)

Causes of Dysphagia Lusoria	
<ul style="list-style-type: none"> Abnormal right subclavian artery^Q (MC) Right aortic arch^Q Double aortic arch^Q Abnormal innominate artery^Q 	<ul style="list-style-type: none"> Vascular ring (constriction) formed by a PDA or a ligamentum arteriosum and the pulmonary artery or aortic arch^Q.

165. Ans. d. Compression by aberrant blood vessel (Ref: Sabiston 19/e p1036-1037; Bailey 25/e p1043-1044)

DYSPHAGIA LUSORIA

- It is a **disorder of swallowing** caused **due to vascular anomalies**^Q (congenital abnormalities)^Q
- Vascular rings and pulmonary slings occur as a result of **developmental abnormalities** of the great vessels that cause **compression of the esophagus**^Q.
 - The MC anomaly is **right subclavian artery** arising from the **descending aorta** and **travels behind the esophagus** to complete its course to the right upper extremity, may cause **significant posterior compression**^Q of the esophagus.
- Anomalous **right aortic arch** with a **left ligamentum arteriosum** and a resultant retroesophageal left subclavian artery will form a **complete ring** that will also cause **posterior esophageal compression**^Q.

- **Pulmonary artery sling** (left pulmonary artery arises from the right pulmonary artery instead of from the main pulmonary artery trunk)^Q

Clinical Features

- Both vascular rings and pulmonary artery slings cause **dysphagia**.
- **Recurrent respiratory infections** and **difficulty in breathing** are also common symptoms.

Diagnosis

- **Barium swallow**: Extrinsic anterior or posterior compression of the esophagus.
- **Angiography** or **HRCT**: Identify the **anomalous anatomy**^Q.

Treatment

- In **symptomatic patients**, both vascular rings and pulmonary artery slings are **repaired**.
- Results: **Dysphagia resolves nearly 100% of the time**^Q.

KOMMERELL'S DIVERTICULUM

- An **aberrant right subclavian artery** originating from the proximal descending thoracic aorta can be associated with **aneurysmal change** at the origin of the artery, known as **Kommerell's diverticulum**^Q.

166. Ans. d. Acquired in later life (Ref: Sabiston 19/e p1036-1037)

Dysphagia lusoria is a disorder of swallowing caused due to vascular anomalies^Q (developmental or congenital abnormalities).

ESOPHAGEAL PERFORATION AND INJURY

167. Ans. a. Vomiting, b. Subcutaneous emphysema, c. Lower thoracic pain (Ref: Sabiston 19/e p1043-1046; Schwartz 10/e p1018, 9/e p874-876; Bailey 26/e p992-993, 25/e p1014-1016; Shackelford 7/e p478-484)

BOERHAAVE'S SYNDROME

- **Spontaneous rupture** usually occurs on the left posterolateral side of the distal esophagus into the left pleural cavity or just above the gastroesophageal junction.
- These patients are typically **male** (85%), **40 to 60 years** of age, who have a history of **recent emesis**^Q.

Clinical Features

- **Mackler's triad**^Q of **thoracic pain**, **vomiting**, and **cervical subcutaneous emphysema** is seen in spontaneous esophageal perforation.

- Thoracic perforations cause **substernal** and **epigastric pain**^Q.
- **Mediastinal emphysema** and **pleural effusions** are common, but early cervical subcutaneous emphysema is noted in only 20% or less of patients.
- **Fever** and **sepsis** develop with increasing contamination and inflammation of the mediastinum and pleural cavities.
- Patients with an **abdominal perforation** have **epigastric abdominal pain** that is also often referred to the **back** and **left shoulder**^Q.

Diagnosis

- **Chest X-ray**: **Hydropneumothorax**^Q
- The **diagnosis** is **confirmed** with a **contrast esophagogram**^Q. This technique will demonstrate extravasation in 90% of patients.

- **Gastrografin** (water soluble) is **preferred**^Q to prevent extravasation of barium into the mediastinum or pleura. If **no leak** is seen, a **barium study** should follow.

- **Chest CT**: **Mediastinal air** and **fluid** at the site of perforation.
- **Endoscopy**: If the **esophagogram** is **negative** or if **operative intervention** is planned.

Treatment

- Appropriate **resuscitation**, secured **airway**, **IV fluids** and **broad-spectrum antibiotics** are started immediately, and the patient is monitored in an ICU.

Within 24 Hours	After 24 Hours
<ul style="list-style-type: none"> • Golden period for primary closure of an esophageal perforation is within the first 24 hours^Q. • Within 24 hours of perforation, inflammation is generally minimal, and primary surgical repair is recommended^Q. • Mortality rate: 8-20% 	<ul style="list-style-type: none"> • Débridement of devitalized tissue + Esophageal diversion or resection + Creation of an esophagostomy + Wide drainage + feeding jejunostomy^Q • Mortality rate: >50%^Q

168. Ans. a. MC at lower 1/3rd, c. Acute chest pain, d. Surgically treated
169. Ans. a. Barium swallow is diagnostic, b. Treatment is primary repair, c. MC after penetrating injury, d. Mortality is increased if repaired after 24 hours
170. Ans. c. Present with acute chest pain, d. Treatment is surgical
171. Ans. b. Cervical portion (Ref: Sabiston 19/e p1043-1046; Schwartz 9/e p874-876; Bailey 26/e p992-993, 25/e p1014-1016; Shackelford 7/e p478-479)

Esophageal Perforation	
Iatrogenic	Spontaneous
<ul style="list-style-type: none"> • Most common type^Q • Caused by endoscopy^Q • MC site is cervical esophagus (cricopharyngeal area)^Q 	<ul style="list-style-type: none"> • Esophageal rupture after vomiting • MC site: left posterolateral side of the distal esophagus^Q

172. Ans. c. At cricopharyngeus muscle (Ref: Sabiston 19/e p1043; Schwartz 9/e p874; Bailey 25/e p1015; Shackelford 7/e p478)
- Esophageal instrumentation accounts for the large majority of iatrogenic perforations, with the cricopharyngeal area most commonly injured^Q

173. Ans. c. Instrumentation
174. Ans. a. Upper esophageal sphincter
175. Ans. d. Esophagectomy with bringing proximal end as fistula in neck
176. Ans. a. Primary closure, drainage and antibiotics
177. Ans. b. Stomach (Ref: Shackelford 7/e p483)

OPERATIVE REPAIR OF ESOPHAGEAL PERFORATION

- The principles of repair comprise a **clear exposure of the perforation** and **debridement** of devitalized tissue, followed by a **primary closure**.
- Following **debridement** of devitalized tissue, **primary mucosal repair** should then be **performed with interrupted, absorbable suture**, taking care to minimize esophageal stricturing while obtaining adequate suture purchase on vital tissue.
- The **muscular layer** is then reapproximated with an **interrupted or running suture**^Q.
 - Subsequent coverage with a **vascular pedicle**, such as an **intercostal muscle flap**, and **pleural, pericardial, or omental pedicle** allows further **buttressing** of a repair and is **recommended whenever feasible**^Q.
 - **Gastric fundus** may also be **suitable tissue reinforcement** especially for the **distal perforation**^Q.
- Depending on the site of perforation, any of the antireflux procedures (**Belsey Mark IV, Nissen, Dor, Toupet**) may be used to buttress the repair.

178. Ans. b. Bradycardia
179. Ans. c. Spontaneous perforation
180. Ans. d. Boerhaave's syndrome
181. Ans. a. Boerhaave's syndrome
182. Ans. a. Cricopharynx
183. Ans. b. Lower posterior
184. Ans. b. Cardioesophageal junction
185. Ans. d. Water soluble low molecular weight contrast swallow

TRACHEO-ESOPHAGEAL FISTULA

186. Ans. d. CVS (Ref: Sabiston 19/e p1837-1839; Schwartz 10/e p608-609, 9/e p1420-1424; Bailey 26/e p118-119, 25/e p84; Shackelford 7/e p509-515)

TRACHEO-ESOPHAGEAL FISTULA

- TEF is an **abnormal communication** (fistula) between the **esophagus** and **trachea**^Q.
- TEF is usually **associated with esophageal atresia**, however it **may also exist without atresia**^Q.
- **Prevalence** of TEF is **2.6-3 per 10,000 births**, with a **slight male predominance**^Q.
- **MC anomaly** associated with TEF is **CVS (VSD)**^Q.

Classification of TEF
<ul style="list-style-type: none"> - Atresia only (6%) - Atresia with proximal TEF (2%) - Atresia with distal TEF (85%): Most common^Q - Atresia with both proximal and distal TEF (rare) - TEF only (1%)

Clinical Features

- The diagnosis of EA is entertained in an **infant with excessive salivation** along with **coughing or choking during the first oral feeding**.
- A **maternal history of polyhydramnios** is often present.
- The newborn baby with atresia **regurgitates all of its first and subsequent feeds**^Q.
- **Saliva pours continuously** from its mouth^Q.
- Repeated episodes of **coughing, choking and cyanosis**^Q occur on feeding in TEF.

Associated Anomalies

- **MC anomaly** associated with TEF is **CVS (VSD)**.
- Esophageal atresia may occur as part of **VACTERL**^Q group of anomalies:
V: Vertebral body segmentation defects^Q
A: Anal atresia^Q
C: Cardiovascular (PDA, VSD)^Q
TE: Tracheo-esophageal fistula^Q
R: Renal (unilateral renal agenesis)^Q
L: Limb anomalies (radial ray hypoplasia)^Q

Diagnosis

- The **inability to pass a NG into the stomach** is a **cardinal feature** for the **diagnosis of EA**.
- If **gas is present in the GIT below the diaphragm**, an associated **TEF is confirmed**
- **Inability to pass a NG tube with absent radiographic evidence** for gastrointestinal gas is **virtually diagnostic of an isolated EA without TEF**.

Treatment

- **Surgical repair with tension free esophageal anastomosis**

Outcome

- The mortality in TEF is **directly related to the associated anomalies**, particularly **cardiac defects and chromosomal abnormalities**^Q.

187. Ans. a. Esophageal atresia with fistula with distal segment

188. Ans. c. Esophageal atresia with distal tracheoesophageal fistula

189. Ans. a. Proximal end blind, distal end communicating with trachea

190. Ans. c. Stenting

191. Ans. a. Expandable metal stent, b. Surgery with graft, c. Gastrostomy tube (Ref: CSDT 11/e p1314; Bailey 26/e p1013, 25/e p1035)

MALIGNANT TRACHEOESOPHAGEAL FISTULA

- It is a **sign of incurable esophageal carcinoma**^Q
- Some have advocated **surgical bypass and esophageal exclusion**, but this is a major procedure
- **Self expanding metallic stent** is the **best treatment**^Q
- **Semi-rigid prosthetic tubings** may be used (**Gastrostomy tube**)^Q

192. Ans. b. Lower end connected to trachea

193. Ans. b. Tracheo-esophageal fistula

ESOPHAGEAL RINGS AND WEBS

194. Ans. a. Mucosal ring at squamo-columnar junction, c. Dysphagia is the symptom (Ref: Sabiston 19/e p1037-1038; Schwartz 10/e p984, 9/e p845-846; Bailey 26/e p1019, 25/e p1041; Shackelford 7/e p89-90)

SCHATZKI'S RINGS

- Consists of a **concentric symmetric narrowing** representing an area of **restricted distensibility** of the **lower esophagus**^Q.
 - **Lying precisely at the squamocolumnar mucosal GEJ**, involves **mucosa and submucosa**^Q
- It consists of **esophageal mucosa above and gastric mucosa below**.
- It **does not have** a component of **true esophageal muscle**, nor is it associated with **esophagitis**.
- It is often accompanied by a **small hiatal hernia**

Clinical Features

- **Most patients** with Schatzki's rings present with **dysphagia**.
- The **dysphagia** is usually to **solid foods only** and comes on **abruptly** with nearly complete obstruction.

- **Episodic aphagia:** Intermittent obstruction of the nondistensible ring by **large pieces of meat**^Q.

- Diagnosis of a Schatzki's ring is made with a **barium swallow**^Q.
- **Schtazki's ring**: Type 'B' ring is located at GE junction^Q

- Asymptomatic patients **incidentally found** to have a Schatzki's ring **require no treatment**.
- Best form of treatment of a **symptomatic Schatzki's ring** without reflux: **Esophageal dilation** for relief of the obstructive symptoms.
- Ring with **proven reflux** and mechanically defective sphincter: **Antireflux procedure**
- **Surgical excision is not indicated**, can cause **devastating esophageal strictures**

195. Ans. b. Lower esophagus 196. Ans. c. Involves mucosa, submucosa and muscularis
197. Ans. b. Located at lower esophagus, c. Causes dysphagia
198. Ans. b. Occurs at GE junction (*Ref: Gastroenterol Hepatol (NY); 2010 November 6 (11): 701-704*)

Types of Esophageal ring on Barium Examination	
Type A	Located few cm proximal to GE junction
Type B	Schatzki's ring: MC esophageal ring found on esophagogram, at GE junction^a
Type C	Located at most distal portion of esophagus , formed by diaphragmatic crural pressure

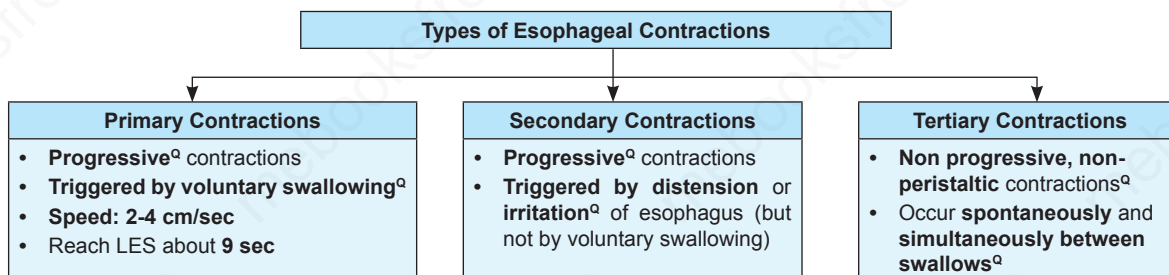
199. Ans. d. Above the cricopharynx (Ref: Schwartz 9/e p2378; Dhingra 4/e p64)

The first constriction where the esophagus commences is at the **cricopharyngeal sphincter**: this is the **narrowest portion of the esophagus** and is the **most common site of foreign body**.

200. Ans. d. Lower esophagus before entering the diaphragm is anterior and left sided (Ref: Sabiston 19/e p1014-1016; Schwartz 10/e p941-947, 9/e p804-806; Shackelford 7/e p18-24)

- Narrowest tube of GIT; Narrowest region of esophagus: Cricopharynx (15 mm diameter)
- **Extent:** C6-T11^o; **Length:** 25-30 cm^o
- **Cervical esophagus** begins as a **midline structure** that **deviates slightly** to the **left^o** of the trachea as it passes through the neck into the thoracic inlet.
- At the level of the **carina**, it **deviates to the right** to accommodate the arch of the aorta.
- It then winds its way back under the left main-stem bronchus and **remains slightly deviated to the left** as it **enters the diaphragm** through the esophageal hiatus^o.
- **Immediately before entering the abdomen**, the **esophagus is pushed anteriorly** by the **descending thoracic aorta^o**.

201. Ans. c. Tertiary (Ref: Sabiston 19/e p1019)



- Tertiary contractions are **simultaneous, non progressive, non peristaltic waves** that can occur **throughout the esophagus**^Q
- Tertiary contractions represent **uncoordinated contractions** of the **smooth muscles** that are **responsible for the 'Cork Screw' appearance of esophageal spasm** on Barium swallow
- Tertiary contractions do not have a physiological function and may be **observed in the elderly** and in patients with **esophageal motility disorders**^Q

202. Ans. a. Arch of aorta, c. Left bronchus (Ref: Sabiston 19/e p1015; Schwartz 10/e p941-947, 9/e p806; Bailey 26/e p987, 25/e p1009)

Esophageal Constrictions			
No.	Distance from incisor teeth	Bony level	Anatomical Landmark
1	15 cm ^a	C6	Pharyngoesophageal junction (At beginning ^a)
2	25 cm ^a		Aortic arch, left bronchus ^a
3	40 cm ^a	T10	Pierces diaphragm ^a

BALD: Beginning, Aortic arch, Left Bronchus, Diaphragm^a

Upper Esophageal Sphincter	Lower Esophageal Sphincter
<ul style="list-style-type: none"> Length: 4-5 cm^a Pressure: 60 mm Hg^a Comprises three skeletal muscle groups: Distal portion of inferior pharyngeal constrictor, cricopharyngeus and circular muscle of proximal esophagus^a 	<ul style="list-style-type: none"> Length: 5 cm^a Abdominal length: 2 cm^a Pressure: 6-26 mm Hg^a

ESOPHAGUS ANATOMY

- Only Auerbach plexus is present in esophagus (Meissner's plexus is absent)^o.
- Lymphatic channels in the lamina propria are the anatomic features **unique** to the esophagus^o.
- The dense submucosal lymphatic plexus facilitates **early dissemination** of esophageal malignancies. In submucosa elastic fibers and collagen combine to make this the **strongest esophageal layer**. Submucosal glands of mixed type are the characteristic of the esophagus^o.
- Lacks a serosal layer^o
- Strongest layer: submucosa
- Lining: Lined by stratified, non-keratinized squamous epithelium
- Muscles:
 - Upper cervical region-Stratified muscle
 - Middle-Gradual transition from stratified to smooth muscle
 - Lower- Smooth muscle

203. Ans. c. 40 cm

204. Ans. b. 15, 25 and 40

205. Ans. b. Where it pierces the diaphragm

206. Ans. a. Left phrenic nerve

207. Ans. d. Left main stem bronchus

208. Ans. b. Bleeding from varices occurs from midesophagus

- Bleeding from esophageal varices most commonly occur in the distal esophagus^o.

DIAPHRAGM

209. Ans. b. Diaphragmatic palsy

- Fluoroscopy is used for diagnosis of diaphragmatic palsy^o.

210. Ans. a. Laparoscopy (Ref: Sabiston 19/e p454-455; Schwartz 10/e p202-203, 9/e p175; Bailey 26/e p356-357, 25/e p344-345)

DIAPHRAGMATIC INJURY

- Diaphragmatic injuries are often caused by penetrating injuries^o.
- Patients sustaining penetrating injuries below the nipples and above the costal margins should be investigated to rule out diaphragmatic injury^o.

Etiology

- Penetrating trauma (knife, bullet, repair of hiatus hernia)
- Blunt trauma (motor vehicle accident, fall from height, bout of hyperemesis):
 - Caused by compressive force applied to the pelvis and abdomen.
 - Rupture is usually large, with herniation of abdominal content into chest

Clinical Features

- Most diaphragmatic injuries are silent and the presenting features are those of injury to the surrounding organs^o.
- Late complication: Herniation of abdominal contents in to the chest^o.
- Herniation of organ: Stomach^o > Colon > Small intestine > Omentum > Spleen > Kidney and pancreas.

Diagnosis

- There is **no single standard investigation** to diagnose **diaphragmatic injuries**^Q.
- **Chest X-ray** after placement of a nasogastric tube may be helpful (as this may show the **stomach herniated into the chest**)
- **Contrast study** of upper or lower GIT, **CT scan** and **diagnostic peritoneal lavage** all **lack positive or negative predictive value**.

- **Most accurate evaluation** is by **video assisted thoracoscopy (VATS)** or **laparoscopy**^Q, offering the **advantage of allowing the surgeon to proceed to repair and additional evaluation of the abdominal organs**.

Treatment

- **Operative repair**^Q is recommended in **all cases**.
 - All **penetrating diaphragmatic injury** must be **repaired via the abdomen** and not the chest, to **rule out penetrating hollow viscus injury**.
- Bergvist Triad:** Rib fracture + Fracture of spine/pelvis + Traumatic rupture of diaphragm

211. Ans. d. Dorsal mesocardium (Ref: Langman 11/e p161)

DEVELOPMENT OF DIAPHRAGM

- Septum transversum → Central tendon^Q
- Mesentery of esophagus → Crura^Q
- Cervical myotomes (muscular input)^Q
- Pleuroperitoneal membranes → Small intermediate muscular portion^Q
- Body wall → Peripheral muscular diaphragm^Q

212. Ans. b. Circumferential (Ref: Sabiston and Spencer's Surgery of Chest 8/e p chapter 7)

Circumferential incision is generally taken for diaphragmatic surgery.

Diaphragmatic incisions

- **Diaphragmatic incisions** can be divided into three groups: **circumferential, central tendon, and radial**.
 1. **Circumferential incisions:**
 - **Circumferential incisions** in the periphery result in **little loss of function**.
 - Must be at least 5 cm lateral to the edge of the central tendon to avoid the posterolateral and anterolateral branches of the phrenic nerve.
 - **Difficult to correctly realign after a long operation**.
 - Placement of surgical clips on each side of the muscular incision can greatly facilitate the correct spatial orientation on closing.
 2. **Incisions in the central tendon:**
 - Do not interrupt any major branch of the nerve itself.
 - **Provide excellent visualization of the abdomen from the thorax**, and vice versa.
 - **Easy to open and to close**.
 3. **Transverse radial incision:**
 - Made from the midaxillary line centrally
 - **Relatively safe**
 - **May result in segmental diaphragmatic paralysis** if the incision transects the crural or posterolateral branches of the phrenic nerve.

MISCELLANEOUS

213. Ans. b. 5

214. Ans. b. Achalasia cardia

215. Ans. b. Achalasia cardia

216. Ans. a. Pharyngeal pouch

- Second swallow is due to regurgitation of barium from pharyngeal pouch

217. Ans. d. Esophageal perforation (Ref: Harrison 18/e p2182)

HAMMAN'S SIGN OR HAMMAN'S CRUNCH

- A **crunching, rasping sound, synchronous with heartbeat, heard over the precordium** and sometimes at a distance from the chest in spontaneous mediastinal emphysema^Q.
- **Hamman's sign** may be present in **acute Mediastinitis** (as in **esophageal perforation**)^Q.

218. Ans. c. 50 (Ref: Shackelford 7/e p545)

- To restore **normal swallowing**, stricture should be **dilated to at least 16 mm diameter or 50 French**.^Q
- **Guidewire directed dilatation** of esophageal strictures is **normal practice in most units**^Q.

219. Ans. b. Guide wire directed stent

220. Ans. c. 50 cm (Ref: Bailey 25/e p1072)

- The **Roux loop** should be at least **50 cm long** to avoid bile reflux esophagitis^Q

Stomach and Duodenum

MULTIPLE CHOICE QUESTIONS

H. PYLORI

- H. pylori is/are associated with:** (PGI Nov 2011)
 - Peptic ulcer
 - Adenocarcinoma
 - Atrophic gastritis
 - B cell lymphoma
 - Gastric leiomyoma
- H. pylori has been implicated in all, except:** (Orissa 2011)
 - Gastric ulcer
 - Gastric carcinoma
 - Gastric lymphoma
 - Gastric leiomyoma
- Which of the following is a common gastric lesion associated with H. pylori and undergoes regression following eradication of the infection?** (MHPGMCET 2009)
 - Inflammatory polyp
 - Metaplastic polyp
 - Fundic gland
 - True adenomas
- Eradication of helicobacter pylori has been proved to be beneficial in which of the following disorders of the stomach?** (COMEDK 2006)
 - Low grade MALT lymphoma
 - Erosive gastritis
 - Carcinoma stomach
 - Gastroesophageal disease
- A patient of peptic ulcer disease. When investigated endoscopically showed chronic antral gastritis. Which of the following dye will be able to stain the specimen?** (AIIMS Nov 2000)
 - PAS
 - Zeihl-Neilson stain
 - Gramstain
 - Warthin-Starry stain
- H. pylori causes:** (TN 2001)
 - Type A Gastritis
 - Type B gastritis
 - Autoimmune
 - Allergic Gastritis
- H. pylori infection causes carcinoma by which mechanism:** (TN 2003)
 - Production of nitrosamines
 - Gastric metaplasia
 - Increasing acid secretion
 - Causing mutation
- H. pylori:** (PGI 2004)
 - Gram negative non-flagellate spiral organism
 - Obligate parasite on gastric mucosa
 - Does not infect duodenal mucosa
 - Antibiotics not effective
- Eradication of H. pylori has been proved to be beneficial in the following condition except:** (ICS 2005)
 - Duodenal ulcer
 - Gastric ulcer

- Low grade MALT lymphoma
 - Hypertrophic gastritis
- Eradication of helicobacter pylori has been proved to be beneficial in which of the following disorder of the stomach?**
 - Low grade MALT lymphoma
 - Erosive gastritis
 - Carcinoma stomach
 - Gastroesophageal disease
 - H. pylori infection is associated with development of which malignancy:** (DPG 2011)
 - MALTomas
 - Atherosclerosis
 - Sarcoma
 - Gastrointestinal stromal tumor (GIST)

PEPTIC ULCER ETIOLOGY AND CLINICAL FEATURES

- Peptic ulcer is associated with all except one:** (AIIMS Feb 97)
 - Cirrhosis
 - Zollinger Ellison syndrome
 - Primary hyperparathyroidism
 - Pernicious anemia
- Which one is not associated with peptic ulcer?** (AIIMS Nov 95)
 - Smoking cigarette
 - Zollinger-Ellison's syndrome
 - Plummer-Vinson syndrome
 - Cirrhosis
- Which of the following factors contribute to the development of duodenal ulcers?** (PGI June 2001)
 - Lysolecithin
 - Gastric acid
 - Alcohol abuse
 - Prostaglandins
 - Smoking
- Commonest site of peptic ulcer is:** (All India 99)
 - 1st part of duodenum
 - 2nd part of duodenum
 - Distal 1/3rd of stomach
 - Pylorus of the stomach
- The most common site of a benign (peptic) gastric ulcer is:** (AIIMS June 2004)
 - Upper third of lesser curvature
 - Greater curvature
 - Pyloric antrum
 - Lesser curvature near incisura angularis

17. **Commonest site of peptic ulcer perforation:** (UPSC 86, Kerala 86, All India 86)
 a. Anterior aspect of the 1st part of duodenum
 b. Posterior aspect of the 1st part of duodenum
 c. Greater curvature of the stomach
 d. Lesser curvature of the stomach
 e. Anterior aspect of 2nd part of duodenum
18. **What is correct about duodenal ulcer?** (Kerala 2003)
 a. 25% will occur if H. pylori is not eradicated
 b. Magnesium containing drugs may cause constipation
 c. Bismuth is not used for long terms
 d. None
19. **With reference to duodenal ulcers, consider the following statements:** (UPSC 2007)
 1. They occur most often in the second part of duodenum
 2. Infection with H. pylori and NSAID - induces injury account for majority of duodenal ulcer
 3. Malignant duodenal ulcers are extremely rare
 4. Eradication of H. pylori has greatly reduced the recurrence rates in duodenal ulcers
 Which of the statements given above are correct?
 a. 1, 2 and 3 only b. 2, 3 and 4 only
 c. 1 and 4 only d. 1, 2, 3 and 4
20. **Burning epigastric pain is due to:** (TN 90)
 a. Vomiting b. Reflux esophagitis
 c. Duodenal ulcer d. Gastric ulcer
21. **Increased gastric acid secretion occurs in:** (AIIMS GIS May 2011)
 a. Type I gastric ulcer b. Type III gastric ulcer
 c. Type IV gastric ulcer d. All of the above
22. **In gastric ulcer, increased acid production is associated with all except:** (AIIMS GIS Dec 2006)
 a. Type I b. Type II
 c. Type III d. Both B and C
23. **Prepyloric or channel ulcer in the stomach is termed as:**
 a. Type 1 b. Type 2 (COMEDK 2008)
 c. Type 3 d. Type 4
24. **A thirty years old male presents to the emergency department with symptoms of epigastric pain radiating to back that wakes him up at night and is relieved by consuming food. He gives history of similar pain in the past which was diagnosed as perforated duodenal ulcer and treated with omental patch surgery on two occasions. Pain before and after surgery has been controlled with proton pump inhibitors and analgesics. The likely diagnosis on this occasion is:** (All India 2011)
 a. Duodenal Ulcer b. Gastric Ulcer
 c. Atrophic Gastritis d. Chronic Pancreatitis
- d. Duodenotomy with ligation of bleeding vessels, highly selective vagotomy
26. **Which of the following vessel is most commonly involved in hemorrhage from duodenal ulcer?** (Recent Question 2014, All India 2012)
 a. IVC
 b. Gastroduodenal artery
 c. SMA
 d. Inferior pancreaticoduodenal artery
27. **Most common complication of chronic gastric ulcer is:** (AIIMS June 93)
 a. Tea pot stomach
 b. Scirrhus carcinoma (Adenocarcinoma)
 c. Perforation
 d. Massive hematemesis
28. **In gastric outlet obstruction in a peptic ulcer patient, the site of obstruction is most likely to be:** (All India 2002, AIIMS June 93)
 a. Antrum b. Duodenum
 c. Pylorus d. Pyloric canal
29. **A Posteriorly perforating ulcer in the pyloric antrum of the stomach is most likely to produce initial localized peritonitis or abscess formation in the following:** (PGI June 2009, All India 2003)
 a. Omental bursa (lesser sac)
 b. Greater sac
 c. Right subphrenic space
 d. Hepatorenal space (pouch of Morison)
30. **A 60 years old male had a sudden fall in toilet. His BP was 90/50 mmHg and PR=100/min. His relatives reported that he is a known case of hypertension and CAD and was regularly taking aspirin, atenolol and sorbitrate. The most likely diagnosis:** (AIIMS May 2012)
 a. Gastric ulcer with bleeding
 b. Acute MI with cardiogenic shock
 c. Acute CVA
 d. Pulmonary embolism
31. **Treatment of perforated peptic ulcer includes:** (PGI Dec 2001)
 a. IV fluids
 b. Drainage of paracolic gutter
 c. Immediate surgery
 d. Antacids
 e. IV pantoprazole
32. **Percentage of patients with perforated peptic ulcer who show free gas under the diaphragm:** (UPPG 2009)
 a. 100% b. 75%
 c. 50% d. 90%
33. **Commonest cause of death in peptic ulcer patients is:** (All India 90)
 a. Perforation b. Hemorrhage
 c. Pyloric stenosis d. Malignancy
34. **Investigation of choice in peptic ulcer perforation is:** (KERALA 94)
 a. USG
 b. X-ray abdomen
 c. Paracentesis
 d. CT scan

PEPTIC ULCER COMPLICATIONS

25. **A 30 years old male presented with massive hematemesis. A 2 × 2 cm ulcer was visualized on upper GI endoscopy on the posterior aspect of first part of duodenum. The bleeding vessel was visualized but bleeding could not be controlled endoscopically. Blood transfusion was done and patient was planned for surgery. His BP was 90/70 and PR=110/min with Hb=9 gm% at the time of surgery. Which of the following would be best surgical management?** (All India 2012)
 a. Antrectomy with ligation of left gastric artery
 b. Duodenotomy with ligation of bleeding vessels with postoperative PPI
 c. Duodenotomy with ligation of bleeding vessels, truncal vagotomy and pyloroplasty
35. **About 6–8 hours after peptic ulcer perforation the disappearance of abdominal wall rigidity is due to:** (UPSC 95)
 a. Cessation of acid secretion in the stomach
 b. Revival from initial shock
 c. Dilution of acid in the peritoneal cavity
 d. Fatigue of reflex arc
36. **Posterior perforation of peptic ulcer drain into:** (DNB 2009)
 a. Omental bursa
 b. Greater sac
 c. Foramen of Winslow
 d. Paracolic gutter

37. Prognosis in a case of duodenal perforation is determined by all except: (PGI 96)

- a. Age of the patient
- b. Duration of history
- c. Basal pneumonia
- d. Peritonitis

38. The vessel which needs to be ligated in a patient with a bleeding peptic ulcer is: (APPG 2015)

- a. Gastroduodenal artery
- b. Superior pancreaticoduodenal artery
- c. Left gastric artery
- d. Left gastroepiploic artery

39. In last decade, duodenal ulcer and its morbidity is reduced due to: (Recent Question 2015) place it after question no. 38 in Stomach and duodenum: (Recent Question 2015)

- a. Lifestyle modification
- b. Eradication of H. pylori
- c. Proton pump inhibitors
- d. None

PEPTIC ULCER DIAGNOSIS AND TREATMENT

40. PPI's for peptic ulcer disease should be taken: (JIPMER 2011)

- a. Before breakfast
- b. After breakfast
- c. After lunch
- d. After dinner

41. Which of the following acid reducing surgery doesn't require drainage procedure? (PGI Dec 2007)

- a. Highly selective vagotomy
- b. Billroth-I operation
- c. Antrectomy
- d. Gastric resection
- e. Truncal vagotomy

42. Highly selective vagotomy preserves: (MHPGMCET 2002)

- a. Nerves of Latarjet
- b. Nerve of Kuntz
- c. Nerve of Mayo
- d. All

43. Stump of stomach and duodenum is present in:

- a. Billroth-I operation
- b. Billroth-II operation
- c. Whipple's operation
- d. Truncal vagotomy

44. Pyloroplasty of choice when the DU is fibrosed and contracted? (MHSSMCET 2009)

- a. Finney's pyloroplasty
- b. Billroth type I surgery
- c. Billroth type II surgery
- d. Ramsted's operation

45. H. pylori is associated with _____% of gastric ulcers:

- a. 5
- b. 20
- c. 40-60
- d. 80

46. A patient who has undergone partial gastrectomy presents with neurological symptoms. Most probable diagnosis: (JIPMER 2011)

- a. Folic acid deficiency
- b. Thiamine deficiency
- c. Vitamin B₁₂ deficiency
- d. Iron deficiency

47. Treatment of high lying ulcer near gastroesophageal junction is/are: (PGI Nov 2009)

- a. Pouchet procedure
- b. Kelling-Madlener operation
- c. Csendes procedure
- d. Total gastrectomy
- e. Vagotomy and pyloroplasty

48. In a highly selective vagotomy, the vagal supply is severed to: (COMEDK 2008)

- a. Proximal two-thirds of stomach
- b. Antrum
- c. Pylorus
- d. Whole of stomach

49. Incorrect about gastric ulcer:

(PGI Nov 2009)

- a. Most common on lesser curvature
- b. 70% H. pylori related
- c. Type IV ulcer most common type
- d. Treatment is primarily medical
- e. 30% GU are associated with malignancy

50. True statement(s) regarding peptic ulcer disease:

- a. Anterior ulcer bleeds more commonly (PGI June 2009)
- b. Posteriorly perforated ulcer is always managed conservatively
- c. Anti-H. pylori drugs must be included in the treatment regime
- d. H. pylori is known to increase incidence of gastric malignancies
- e. Increase acid production in prerequisite for gastric ulcer

51. All of the following drugs are used in the management of peptic ulcer except: (COMEDK 2005)

- a. Alginic acid
- b. Sucralfate
- c. Misoprostol
- d. Ipratropium

52. The investigations for duodenal ulcer are: (PGI Dec 2001)

- a. Hypotonic duodenography
- b. Barium meal
- c. Barium swallow
- d. Upper GI endoscopy
- e. Abdominal X-ray erect view

53. Surgery of choice for chronic duodenal ulcer is:

(Recent Question 2014, AIIMS June 93)

- a. Vagotomy + antrectomy
- b. Total gastrectomy
- c. Truncal vagotomy + pyloroplasty
- d. Highly selective vagotomy

54. Patient presents with recurrent duodenal ulcer of 2.5 cm size, procedure of choice: (All India 2001)

- a. Truncal vagotomy and antrectomy
- b. Truncal vagotomy and gastrojejunostomy
- c. Highly selective vagotomy
- d. Laparoscopic vagotomy and gastrojejunostomy

55. Lowest recurrence rate in duodenal ulcer treatment is seen with:

(MHCET 2016, Recent Question 2014, AIIMS Nov 94, All India 2002)

- a. Highly selective vagotomy
- b. Truncal vagotomy
- c. Truncal vagotomy and antrectomy
- d. Truncal vagotomy and pyloroplasty

56. Endoscopy is useful in diagnosis of peptic ulcer in following situations except: (JIPMER 79, PGI 80)

- a. Post bulbar ulcer
- b. Stomal ulcers
- c. Giant duodenal ulcer
- d. Duodenal erosion

57. All of the following are indications for surgery in a case of duodenal ulcer except: (UPCS 96)

- a. Acute perforation of ulcer
- b. Pyloric stenosis
- c. Massive hemorrhage
- d. Typical periodicity

58. Maximal reduction in gastric acidity is achieved by:

(Recent Question 2014, UPCS 97)

- a. Truncal vagotomy and pyloroplasty
- b. Truncal vagotomy and antrectomy
- c. Partial gastrectomy
- d. Highly selective vagotomy

59. Perforated peptic ulcer is treated by:

(SGPGI 2005)

- a. Vagotomy + Pyloroplasty
- b. Vagotomy + Antrectomy
- c. Vagotomy + repair of perforation
- d. Graham's repair

60. Lesser curvature anterior seromyotomy is indicated in: (MAHE 2005)
 a. Gastric ulcer
 b. Gastric CA
 c. Duodenal blowout
 d. Duodenal ulcer
61. The most commonly practiced operative procedure for a perforated duodenal ulcer is: (Recent Question 2014, Karnataka 2005)
 a. Vagotomy and pyloroplasty
 b. Vagotomy and antrectomy
 c. Vagotomy and perforation closure
 d. Graham's omentum patch repair
62. In a highly selective vagotomy, the vagal supply is severed to: (COMEDK 2007)
 a. Proximal two-thirds of stomach
 b. Antrum
 c. Pylorus
 d. Whole of stomach
63. Treatment of choice in type III gastric ulcer is: (UPPG 2008)
 a. Vagotomy only
 b. Vagotomy and antrectomy
 c. Vagotomy and pyloroplasty
 d. Highly selective vagotomy
64. In type IV gastric ulcer bleed with unstable patient, treatment: (AIIMS GIS Dec 2009)
 a. Csendes procedure
 b. Pouchet procedure
 c. Kelling Madlener procedure
 d. Vagotomy and antrectomy
65. All are true about HSV except: (AIIMS GIS Dec 2006)
 a. Spares antral fibers
 b. Nerve of Grassi is resected
 c. Pyloroplasty done
 d. Gastric tone altered
66. Treatment of type II and type III gastric ulcer: (AIIMS GIS Dec 2006)
 a. Vagotomy + antrectomy
 b. HSV
 c. Total gastrectomy
 d. Truncal vagotomy and drainage
67. HSV is done in: (AIIMS GIS Dec 2006)
 a. Menetrier's disease
 b. Giant gastric ulcer
 c. Gastric mucosal erosions
 d. Megaesophagus treatment by esophageal mucosal resection
68. Gastric atony is least after: (AIIMS GIS Dec 2011)
 a. Truncal vagotomy + GJ
 b. Truncal vagotomy + Pyloroplasty
 c. Truncal vagotomy + Antrectomy
 d. HSV
72. Gastric atony occurs in all except: (AIIMS GIS Dec 2006)
 a. Billroth-I
 b. Billroth-II
 c. HSV
 d. Posterior selective vagotomy with anterior seromyotomy
73. Long-term effects of gastrectomy includes: (PGI SS Dec 2009)
 a. Renal calculi
 b. Vitamin C deficiency
 c. Hypothyroidism
 d. Osteomalacia
74. Dumping syndrome is due to: (Recent Question 2015, All India 99)
 a. Diarrhea
 b. Presence of hypertonic content in small intestine
 c. Vagotomy
 d. Reduced gastric capacity
75. Which is not true about dumping syndrome? (DNB 2014)
 a. Post vagotomy
 b. Small frequent meals is beneficial
 c. Starch is beneficial
 d. Clinical features include diarrhea and bloating
76. All are true regarding early post-cibal syndrome, except: (All India 2000)
 a. Distension of abdomen
 b. Managed conservatively
 c. Hypermotility of intestine is common
 d. Surgery is usually indicated
77. Duodenal blow out following Billroth gastrectomy most commonly occurs on which day: (Recent Question 2015, AIIMS June 93)
 a. 2nd day
 b. 4th day
 c. 6th day
 d. 12th day
78. In gastrectomy following occurs except: (PGI Dec 97)
 a. Calcium deficiency
 b. Steatorrhea
 c. Fe²⁺ Deficiency
 d. Fluid loss
79. The earliest manifestation seen after gastrectomy: (PGI Dec 2005)
 a. Incidence of infection
 b. Loss of storage capacity
 c. Loss of HCl
 d. Loss of intrinsic factor
80. The commonest earliest complication of TV and GJ is:
 a. Stomal obstruction
 b. Paralytic ileus (AIIMS 91)
 c. Gastric leak
 d. Anastomotic hemorrhage
81. Anemia is greater in which of the following gastric resection: (PGI 81, AMU 85)
 a. Billroth-II
 b. Billroth-I
 c. Both of the above are equal
 d. Neither of the above
82. A person who had undergone gastrojejunostomy suddenly develops severe diarrhea. Which should be suspected?
 a. Gastric carcinoma (TN 95)
 b. Tuberculosis of abdomen
 c. Gastrojejunocolic fistula
 d. Gastric amoebiasis
83. The operation where in the stump of the stomach is directly anastomosed to the stump of the duodenum is called: (Karnataka 96)
 a. Polya gastrectomy
 b. Hoffmeister gastrectomy
 c. Billroth-I gastrectomy
 d. Billroth-II gastrectomy
84. Gastrojejunostomy is an example of:
 a. Clean contaminated wound (DNB 2001, JIPMER 2008)
 b. Clean uncontaminated wound
 c. Unclean uncontaminated wound
 d. Unclean contaminated wound
85. Which is a clean surgery: (Recent Questions 2013)
 a. Hernia surgery
 b. Gastric surgery
 c. Cholecystectomy
 d. Rectal surgery

GASTRECTOMY AND COMPLICATIONS

69. Most common metabolic complication of gastrectomy: (AIIMS GIS Dec 2011)
 a. Iron deficiency anemia
 b. Megaloblastic anemia
 c. Hypocalcemia
 d. Osteoporosis
70. Most common abnormality after gastric resection and Billroth-II: (AIIMS GIS Dec 2009)
 a. Vitamin B₁₂ deficiency
 b. Steatorrhea
 c. Calcium deficiency
 d. Vitamin D deficiency
71. A patient of partial gastrectomy presents with neurological symptoms. Most probable diagnosis is: (JIPMER 2011)
 a. Folic acid deficiency
 b. Thiamine deficiency
 c. Vitamin B-12 deficiency
 d. Iron deficiency

86. **Duodenal blowout is:** (APPG 97)
 a. Perforation of duodenal ulcer
 b. Iatrogenic
 c. Complication of partial gastrectomy
 d. Due to trauma
87. **Postvagotomy diarrhea can be effectively managed by:** (UPSC 2002)
 a. Steroids
 b. Thyroxine
 c. Somatostatin analogue
 d. Parathormone
88. **The first gastrectomy was performed in 1881 by:**
 a. Miculicz
 b. Wolfer
 c. Billroth
 d. Moynihan
89. **All are true about gastric resection except:** (DPG 2008)
 a. Decreased protein absorption
 b. Increased intestinal secretion
 c. Calcium deficiency
 d. Increased intestinal motility
90. **Dumping syndrome is characterized by all of the following except:** (MCI March 2005)
 a. Colic
 b. Tremors and giddiness
 c. Hyperglycemia
 d. Epigastric fullness
91. **Which of the following plays a major role in the development of dumping syndrome?** (MCI March 2009)
 a. Vagolytic mechanism
 b. Smaller stomach
 c. Excessive food in the stomach
 d. Large volume of hyperosmotic fluid in the intestine
92. **BLEED risk criteria include all except:** (AIIMS GIS Dec 2009)
 a. Ongoing bleeding
 b. Low urine output
 c. BP < 100 mm Hg
 d. Altered mental status
93. **In Forrest classification, high-risk of bleeding is associated with all except:** (KGMC 2011)
 a. Visible vessel
 b. Visible pulsatile bleeding
 c. Adherent clot
 d. Visible oozing from vessel
94. **In case of UGI bleeding, all are true about endoscopy except:** (AIIMS GIS Dec 2009)
 a. Decreases transfusion requirement
 b. Leads to early discharge of the patient
 c. Can detect causes in all cases
 d. Best tool for localization of bleeding
95. **Investigation of choice for UGI bleed:** (WBPG 2012, PGI SS 2004, June 97)
 a. Endoscopy
 b. Angiography
 c. CT
 d. Barium studies
96. **Which of the following is the incorrect statement regarding GI bleeding?** (AIIMS Nov 2004)
 a. The sensitivity of angiography for detecting GI bleeding is about 10–20% as compared to nuclear imaging
 b. Angiography can image bleeding at a rate of 0.05–0.1 ml/min or less
 c. 99m Tc-RBC scan will image bleeding at rates as low as 0.05–0.1 ml/min
 d. Angiography will detect bleeding only if extravasation is occurring during the injection of contrast
97. **Causes of upper GI bleed include all except:** (PGI Dec 96)
 a. Peptic ulcer
 b. Erosive gastritis
 c. Esophageal varices
 d. CA stomach
98. **True about upper GI bleeding:** (PGI Dec 2003)
 a. Melena is the only symptom
 b. Bleeding occurs beyond the ampulla of Vater
 c. Endoscopy can best diagnose it
 d. Peptic ulcer is the MC cause
 e. ↑d BUN
99. **A male executive, 50 years of age is seen in casualty with hypotension and hematemesis. There is previous history suggestive of alcohol intake of 100 ml daily. The blood loss is around 2 litres. Most probable diagnosis is:** (AIIMS June 2001)
 a. Gastritis
 b. Duodenal ulcer
 c. Mallory-Weiss tear
 d. Esophageal varices
100. **A 42 years old company executive presents with sudden upper GI bleed (5 litres) of bright red blood, with no significant previous history. The diagnosis is:** (All India 2000)
 a. Esophageal varices
 b. Duodenal ulcer
 c. Gastritis
 d. Gastric erosion
101. **Which of the following management procedures of acute upper gastrointestinal bleed should possibly be avoided?** (AIIMS Nov 2003)
 a. Intravenous vasopressin
 b. Intravenous beta-blockers
 c. Endoscopic sclerotherapy
 d. Balloon tamponade
102. **Following resuscitation, a patient with bleeding esophageal varices should be treated initially with:** (AIIMS Nov 2004)
 a. Sclerotherapy
 b. Sengstaken Blackmore tube
 c. Propranolol
 d. Surgery
103. **During sclerotherapy (by endoscopy), following are complications except:** (PGI June 98)
 a. Hepatic encephalopathy
 b. Perforation
 c. Stenosis
 d. Fibrosis
104. **A patient presented to emergency ward with massive upper gastrointestinal bleed. On examination, he has mild splenomegaly. In the absence of any other information available, which of the following is the most appropriate therapeutic modality?** (AIIMS Nov 2005)
 a. Intravenous propranolol
 b. Intravenous vasopressin
 c. Intravenous pantoprazole
 d. Intravenous somatostatin
105. **A patient comes with hematemesis and melena. On the upper GI endoscopy there was no significant finding. 2 days later the patient rebleeds. Next line of investigation is:** (AIIMS May 2007)
 a. Emergency angiography
 b. Repeat upper GI endoscopy
 c. Enteroscopy
 d. Laparotomy
106. **The most sensitive test to detect GI bleeding is:** (PGI 79, AIIMS 81)
 a. Selective angiography
 b. Radiolabelled erythrocyte scanning
 c. I-131 fibrinogen studies
 d. Stool for occult blood
107. **In the Forrest classification for bleeding peptic ulcer with a visible vessel of pigmented protuberance is classified as:** (COMEDK 2006)
 a. FI
 b. FII a
 c. FII b
 d. FII c
108. **45 years executive suddenly develops hematemesis at home. He is brought to the hospital 4 hours later, there he again has a bout of hematemesis. Total blood loss would be around 2 litres. Most likely diagnosis is:** (AIIMS 2001)
 a. Gastritis
 b. Esophagitis
 c. Esophageal varices
 d. Duodenal ulcer

UPPER GI BLEED

109. Most common cause of upper gastrointestinal tract bleeding is: (Recent Questions 2015, 2014, 2013)

- a. Esophageal varices
- b. Peptic ulcer
- c. Gastritis
- d. Mallory weiss tear

110. Among the following, the least common cause of acute upper GI bleeding is: (APPG 2015)

- a. Vascular ectasia
- b. Mallory Weiss tear
- c. Ulcer
- d. Varices

MALLORY-WEISS TEAR

111. False about Mallory-Weiss syndrome: (ILBS 2011)

- a. Massive hemorrhage is MC manifestation
- b. Alcohol is an associated etiology
- c. Conservative treatment is effective in most of the cases
- d. Anti-reflux procedure doesn't have added advantage

112. True about Mallory Weiss tear: (PGI Nov 2009)

- a. Hamman mediastinum
- b. Esophagus perforates at all layers
- c. Auscultation - Crunching sound
- d. Symptoms improves after conservative management
- e. Longitudinal tear at junction of esophagus and stomach

113. An old man presenting to the emergency following a bout of prolonged vomiting with excessive hematemesis following alcohol ingestion is likely to suffer from: (UPSC 2005)

- a. Mallory-Weiss syndrome
- b. Esophageal varices
- c. Gastric cancer
- d. Bleeding disorder

114. About Mallory-Weiss syndrome true is: (PGI Dec 99)

- a. Gastrointestinal reflux
- b. Obesity
- c. Tumour at gastroesophageal junction
- d. Seen in alcoholics

115. Mallory-Weiss syndrome is partial thickness rupture occurs at: (WBPG 2014, PGI Dec 97)

- a. Gastric cardia
- b. Esophagus mucosa
- c. Gastroesophageal junction
- d. Gastroduodenal junction

116. Mallory-Weiss syndrome often occurs in: (PGI 87)

- a. Patient who abuse analgesics
- b. Children
- c. Pregnant females
- d. Patients with hiatus hernia

117. Violent vomiting after forceful retching present with sudden severe hematemesis diagnosis is: (UPPG 2009)

- a. Haemangioma
- b. Carcinoma oesophagus
- c. Mallory-Weiss syndrome
- d. Esophageal varices

118. Bleeding from a Mallory Weiss tear occurs usually from: (AIIMS May 2015)

- a. Phrenic vein
- b. Left gastric artery
- c. Short gastric arteries
- d. Coronary vein

DIEULAFOY'S LESION

119. All are true about Dieulafoy's lesion except: (AIIMS GIS Dec 2011)

- a. Angiographic embolization is the preferred treatment
- b. Endoscopic treatment can be given
- c. Pulsation of artery causes ulceration
- d. Submucosal artery

120. All are true about Dieulafoy's lesion except:

- a. Submucosal tortuous artery (AIIMS GIS Dec 2006)
- b. Mucosal erosion by arterial pulsation
- c. Amenable to endoscopic treatment
- d. Angiographic embolization-preferred treatment

121. Dieulafoy's lesion: (PGI SS June 2005)

- a. Within 6 cm of GE junction
- b. In esophagus
- c. In ileum
- d. In rectum

122. Dieulafoy's lesion is: (MHSSMCET 2006)

- a. Prolapse gastropathy
- b. Gastric antral vascular ectasia
- c. Gastric hemorrhagic telengectasias
- d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

GAVE

123. All are true about GAVE except: (JIPMER GIS 2011)

- a. Dilated submucosal venous plexus
- b. Bleeding is the most common presentation
- c. Pain is most common clinical symptom
- d. Argon laser treatment is established one

124. True regarding gastric antral vascular ectasia (GAVE):

- a. Capillary lesion (PGI Nov 2009)
- b. Arterial type
- c. Difficult to manage because of multiplicity and size
- d. Best treatment argon plasma coagulation
- e. Associated with chronic renal failure and iron deficiency anaemia

125. 'Watermelon stomach' is: (MHSSMCET 2008)

- a. Prolapse gastropathy
- b. Gastric antral vascular ectasia
- c. Gastric hemorrhagic telengectasias
- d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

MENETRIER'S DISEASE

126. Menetrier's disease is characterized by all except:

- a. Excessive protein loss (AIIMS GIS Dec 2011)
- b. Excessive mucus production
- c. Diarrhea
- d. Hyperchlorhydria

127. All are true about Menetrier's disease except:

- a. Protein loss (AIIMS GIS Dec 2006)
- b. Hyperchlorhydria
- c. Cobblestone appearance of mucosa
- d. Associated with CMV and H. pylori

128. All are true about Menetrier's disease except:

- a. Excessive protein loss (JIPMER GIS 2011)
- b. Decreased mucus production
- c. Acquired, premalignant condition
- d. H. pylori is a predisposing factor in adults

129. Thickened gastric folds are found in: (PGI June 2003)

- a. Lymphoma
- b. Menetrier's disease
- c. Carcinoma
- d. Eosinophilic gastritis
- e. Giardiasis

- 154. Not seen in intestinal type of gastric cancer:** (AIIMS GIS Dec 2011, Dec 2009)
 a. Decreased E-cadherin b. APC
 c. Microsatellite instability d. p53
- 155. Not true in case of diffuse carcinoma stomach:** (AIIMS GIS Dec 2009)
 a. More common
 b. Poorly differentiated with signet ring cells
 c. Transmural or lymphatic spread
 d. Decreased E-cadherin
- 156. Not seen in intestinal type of gastric cancer:**
 a. Decreased E-cadherin b. APC (AIIMS GIS Dec 2009)
 c. p16 d. p53
- 157. All are true about diffuse gastric carcinoma (Lauren's) except:** (JIPMER GIS 2011)
 a. Blood group 'A' b. E-cadherin positive
 c. Hematogenous spread d. Common in females
- 158. Carcinoma stomach which perforates serosa but doesn't involve nearby structures, the stage is:** (KGMC 2011)
 a. I b. II
 c. IIIA d. IIIB
- 159. Diffuse and intestinal variant of CA stomach both have:** (AIIMS GIS Dec 2006)
 a. E-cadherin b. APC
 c. p53 d. Microsatellite instability
- 160. Gastric lymph node station no 5:** (AIIMS GIS Dec 2009)
 a. Suprapyloric b. Splenic hilum
 c. Lesser curvature d. Greater curvature
- 161. Level 9 lymph node includes:** (AIIMS GIS Dec 2010)
 a. Celiac nodes
 b. Splenic hilum
 c. Splenic artery
 d. Hepatoduodenal ligament
- 162. Sister Joseph's nodule may indicated cancer of all the following except:** (COMEDK 2004)
 a. Stomach b. Large bowel
 c. Rectum d. Ovary
- 163. Which of the following statements about gastric carcinoma are true?** (All India 2011)
 a. Squamous cell carcinoma is the most common histological subtype
 b. Often associated with hypochlorhydria/achlorhydria
 c. Occult blood in stool is not seen
 d. Highly radiosensitive tumor
- 164. Most common site of carcinoma of stomach is:** (JIPMER 2010)
 a. Proximal stomach b. Gastric antrum
 c. Lesser curvature d. Greater curvature
- 165. An ulcero-proliferative lesion in the antrum of the stomach 6cm in diameter, invading the serosa, with 10 enlarged lymph nodes around and pylorus with no distant metastasis, the TNM staging is:** (COMEDK 2011)
 a. T2N1M0 b. T3N2M0
 c. T4N1M0 d. T1N3M0
- 166. True about gastric stump carcinoma:** (PGI Nov 2009)
 a. Enterogastric reflex is the cause
 b. Prognosis good after surgery
 c. It is always adenocarcinoma in nature
 d. Diffuse type is only variety
- 167. All are true about gastric CA except:** (PGI June 2009)
 a. H. pylori association is present
 b. D2 gastrectomy include total gastrectomy
 c. Surgical non curative lesion should not be resected
 d. Patient under total gastrectomy should be given vitamin B₁₂
 e. Hematemesis present in majority of patients
- 168. Troisier's sign is:** (MHPGMCET 2008, 2006, APPG 96)
 a. Metastatic left supraclavicular lymphadenopathy
 b. Carpopedal spasm in hypocalcemia
 c. Migratory thrombophlebitis
 d. Any of the above
- 169. Independent risk factor for carcinoma stomach:** (MHPGMCET 2008)
 a. H. pylori
 b. Gastrectomy with drainage procedure
 c. Vagotomy with drainage procedure
 d. All of the above
- 170. Irish node is most commonly seen in:** (WB PG 2015)
 a. CA stomach
 b. CA lung
 c. CA larynx
 d. CA endometrium
- 171. True about carcinoma stomach include all the following except:** (MHSSMCET 2007)
 a. Smoky diet is risk factor
 b. Incidence is now decreasing in Japan and China
 c. Duodenal ulcers are not associated with gastric cancer
 d. Gastric adenocarcinoma is a radioresistant tumor
- 172. When carcinoma of stomach develops secondarily to pernicious anemia, it is usually situated in the:** (All India 2006)
 a. Pre-pyloric region b. Pylorus
 c. Body d. Fundus
- 173. The best prognosis in carcinoma stomach is with:** (Bihar PG 2014, UPSC 2008, All India 95)
 a. Superficial spreading type
 b. Ulcerative type
 c. Linitis plastica type
 d. Polypoidal type
- 174. All the following indicates early gastric cancer except:** (Recent Question 2015, DNB 2006, All India 2002, AIIMS Feb 97)
 a. Involvement of mucosa
 b. Involvement of mucosa and submucosa
 c. Involvement of mucosa, submucosa and muscularis
 d. Involvement of mucosa, submucosa and adjacent lymph nodes
- 175. For early diagnosis of CA stomach, which method is used?** (AIIMS Feb 97)
 a. Endoscopy
 b. Staining with endoscopic biopsy
 c. Physical examination
 d. Ultrasound abdomen
- 176. True about gastric cancer are all except:** (PGI May 2005)
 a. Incidence increasing world wide
 b. Incidence of upper gastric cancer increasing
 c. Surgically correctable
 d. Prognosis depends on the depth of the lesion than the size of the lesion.
- 177. True about stomach carcinoma:** (PGI Dec 2000)
 a. Weight loss is commonest feature
 b. Secondaries are most commonly seen in peritoneum and omentum
 c. Lymphatic and hematogenous spread are rare
 d. Barium meal is diagnostic
 e. Radioresistant
- 178. An adult presented with hematemesis and upper abdominal pain. Endoscopy revealed a growth at the pyloric antrum of the stomach. CT scan showed growth involving the pyloric antrum without infiltration or invasion into surrounding structures and no evidence of distant metastasis. At laparotomy neoplastic growth was observed to involve the**

posterior wall of stomach and the pancreas extending 6 cm up to tail of pancreas. What will be the most appropriate surgical management? (All India 2010)

- Closure of the abdomen
- Antrectomy and vagotomy
- Partial gastrectomy + distal pancreatectomy
- Partial gastrectomy + distal pancreatectomy + splenectomy

179. Kally, a 60 years old male diagnosed to have carcinoma stomach. CT scan of abdomen showed a mass measuring 4 × 4 cm in the antrum with involvement of celiac nodes and right gastric nodes. Management of choice is: (AIIMS June 2001)

- Total gastrectomy
- Subtotal gastrectomy
- Palliative
- Chemotherapy

180. True about early gastric carcinoma: (PGI Dec 2002)

- Invasion of mucosa and submucosa with neighboring lymph node
- Invasion of mucosa and submucosa irrespective to L.N. spread
- Endoscopic removal of lesions
- Conservative gastrectomy

181. Operability in carcinoma stomach is indicated by all except: (PGI 86)

- Involvement of omental nodes
- Involvement of lymph nodes at the celiac axis
- Lymph node at porta hepatis
- Solitary metastatic nodule in the liver
- Krukenberg tumor

182. Linitis plastica is commonly seen in:

(Recent Question 2014, DNB 2005, 2001, 2000, All India 91)

- Carcinoma stomach
- Sarcoidosis
- Lymphoma
- Leiomyosarcoma

183. All of the following may be features of a silent carcinoma of the body of the stomach except: (JIPMER 80, AMU 89)

- Obstructive jaundice
- Ascites
- Dysphagia
- Krukenberg tumours

184. Presenting symptom of carcinoma stomach is:

(AIIMS 81, APPG 90)

- Bleeding
- Obstruction
- Perforation
- Weight loss

185. Gastric carcinoma involving the antrum with lymph node involvements. The pancreas, liver and peritoneal cavity are normal. Most appropriate surgery is:

- Total radical gastrectomy
- Palliative gastrectomy
- Gastrojejunostomy
- None of the above

186. Lymphatic drainage of CA stomach is mostly to: (DPG 2005)

- Left gastric
- Pyloric
- Celiac
- None of the above

187. Sister Mary Joseph nodule is most commonly seen with:

- Ovarian cancer
- Stomach cancer
- Colon cancer
- Pancreatic cancer

188. Peritoneal dissemination of gastric cancer is best detected by: (COMEDK 2014)

- USG
- Laparoscopy
- CT
- MRI

189. Locally invasive gastric carcinoma. Investigation of choice to know depth of cancer invasion: (Recent Questions 2013)

- CECT
- MRI
- Barium
- EUS

190. Most common cause of Krukenberg's tumor is: (DNB 2014)

- Ovary
- Liver
- Stomach
- Kidney

GASTROINTESTINAL STROMAL TUMOR (GIST)

191. Cell of origin in GIST: (GB Pant 2011)

- Mesenchymal
- Argentaffin
- Smooth muscle
- Epithelial

192. False about GIST: (K GMC 2011)

- Stomach is most common site
- Can present with bleeding
- Commonly metastasize to lymph nodes
- Can present with peritoneal metastasis

193. Sunitinib is used in: (K GMC 2011)

- GIST
- Rectal cancer
- Colonic carcinoma
- Pancreatic carcinoma

194. Tyrosine kinase inhibitor imatinib is used for the treatment of:

- Fibrosarcoma phylloides
- GIST
- MALT
- Seminoma

195. A 50 years old male presents with obstructive symptoms. Biopsy of stomach reveals gastrointestinal stromal tumor (GIST). Most appropriate market for GIST is:

- CD-34
- CD-117
- CD-30
- CD-10

196. Gold standard investigation for recurrent gastrointestinal stromal tumor is: (AIIMS May 2011)

- MRI
- MIBG
- USG
- PET-CT

197. True about GIST all except:

(Recent Question 2015, AIIMS Nov 2010)

- Most common in duodenum
- Necrosis and ulceration present
- PET is used to assess response to therapy
- Cell circumscribed

198. Carney triad consists of: (PGI May 2011)

- Gastric carcinoma
- Paraganglioma
- Pulmonary chordoma
- Carcinoma bronchus
- Chondromatosis

199. GIST (Stromal tumors of GI tract) arise from:

(MHSSMCET 2008)

- Paneth cells
- Stave cells
- Enterocytes
- Interstitial cells of Cajal

200. Commonest stomach tumour which bleeds: (PGI 88)

- Adenocarcinoma
- Squamous carcinoma
- Leiomyosarcoma
- Fibrosarcoma

201. Bleeding is seen maximally in which gastric tumors?

(Punjab 2008)

- Adenocarcinoma
- Squamous cell carcinoma
- Leiomyosarcoma
- GIST

202. Which of the following is not true about Gastrointestinal Stromal Tumor (GIST)? (AIIMS November 2014)

- Originates from interstitial cells of Cajal
- Most common mesenchymal tumour of gastrointestinal tract
- Prognosis depends on size
- ALK gene mutation is seen in most of the cases

GASTRIC LYMPHOMA

203. All are true about stomach lymphoma except:

(GB Pant 2011)

- Most common type is NHL
- Large B cell type
- Chemosensitive
- Most common site is fundus

204. The commonest site of lymphoma in the gastrointestinal system is: (COMEDK 2007)
 a. Small bowel b. Stomach
 c. Large intestine d. Oesophagus
205. Treatment of gastric lymphoma includes: (PGI May 2011)
 a. Chemotherapy b. Radiotherapy
 c. Surgery d. Anti-H. pylori treatment
 e. Endoscopic resection
206. Indication of surgery in gastric lymphoma are all except: (PGI May 2011, AIIMS Nov 2005, Nov 2002)
 a. Bleeding
 b. Perforation
 c. Residual disease after chemotherapy
 d. Intractable pain
207. False about gastric lymphoma is: (AIIMS May 2008)
 a. Stomach is the most common site
 b. Associated with H. pylori infection
 c. Total gastrectomy with adjuvant chemotherapy is treatment of choice
 d. 5 years survival rate after treatment is 60%
208. All of the following are indications for surgery in gastric lymphomas except:
 a. Bleeding
 b. Perforation
 c. Residual disease following chemotherapy
 d. Intractable pain
209. The treatment of Hodgkin's disease of stomach is: (Karnataka 89)
 a. Gastric resection
 b. Gastric resection and chemotherapy
 c. Purely medical
 d. None of the above
210. The following are true regarding primary gastric lymphoma except: (APPG 2016)
 a. More amenable to treatment than gastric adenocarcinoma
 b. H. pylori is implicated especially in MALT type
 c. Mostly of B cell origin
 d. Clinically can be easily differentiated from gastric adenocarcinoma by the presence of early satiety and prominent lymph node metastases
- c. Hypochloremic metabolic acidosis
 d. Hyperchloremic metabolic acidosis
 e. Hyperchloremic metabolic alkalosis
216. A 3 weeks old patient presenting with vomiting and failure to thrive is found to have pyloric stenosis. What should be the next step of management? (AIIMS May 2011)
 a. Its emergency so do pyloromyotomy immediately
 b. Fluid resuscitation may be delayed
 c. Correction of electrolyte disturbances
 d. Cardiopulmonary resuscitation
217. Investigation of choice to diagnose hypertrophic pyloric stenosis in infants is: (Recent Question 2015, 2014, COMEDK 2011)
 a. Contrast radiology
 b. Gastroscopy
 c. Ultrasound abdomen
 d. CT abdomen
218. All are seen in hypertrophic pyloric stenosis except: (NEET Pattern, AIIMS GIS 2003)
 a. Hyponatremia b. Hypokalemia
 c. Metabolic acidosis d. Metabolic alkalosis
219. Hypertrophic pyloric stenosis presents as: (Recent Question 2014, GB Pant 2011)
 a. Mass in epigastrium
 b. More common in girls
 c. Congenital
 d. Present at birth with bilious vomiting
220. Olive shaped mass on feeding is pathognomonic of: (DNB 2005)
 a. Hypertrophic pyloric stenosis
 b. Duodenal atresia
 c. Jejunal atresia
 d. Ileal stenosis
221. Ramsted's operation is performed for:
 a. Hirschsprung's disease
 b. CHPS (Bihar PG 2014, MHSSMCET 2005, Kerala 94)
 c. Duodenal atresia
 d. Anorectal malformation
222. What is the most characteristic of congenital hypertrophic pyloric stenosis? (All India 2003)
 a. Affects the first born female child
 b. The pyloric tumour is best felt during feeding
 c. The patient is commonly marasmic
 d. Loss of appetite occurs early
223. In a case of hypertrophic pyloric stenosis, the metabolic disturbance is: (Bihar PG 2014, JIMER 2013, All India 2002)
 a. Respiratory alkalosis
 b. Metabolic acidosis
 c. Metabolic alkalosis with paradoxical aciduria
 d. Metabolic alkalosis with alkaline urine
224. Clinical features of pyloric stenosis in infants are all except:
 a. Abdominal lump b. Constipation (All India 93)
 c. Weight loss d. Metabolic acidosis
225. Congenital pyloric stenosis causes: (PGI Dec 2002)
 a. Bilious vomiting b. Non-bilious vomiting
 c. Projectile vomiting d. Non-projectile vomiting
 e. Forceful vomiting

DUODENAL ATRESIA

211. Anomaly associated with duodenal atresia is: (DNB 2010)
 a. Down's syndrome b. Duodenal adenomas
 c. Limb defects d. Autoimmune disorders
212. Antenatal double bubble appearance on ultrasound is due to: (Bihar PG 2014, PGI June 97)
 a. Diaphragmatic hernia b. Duodenal atresia
 c. Gastric volvulus d. Intussusception
213. Double Bubble sign is seen with: (PGI Dec 2006, DNB 2007, 2003, AIIMS May 2009)
 a. Pyloric stenosis b. Duodenal atresia
 c. Ileal atresia d. Esophageal atresia
214. Which is the treatment of choice for duodenal atresia? (DNB, 2011, 2002 MHSSMCET 2005)
 a. Duodenoduodenostomy b. Duodenojejunostomy
 c. Bishop-Koop Procedure d. Gastroduodenostomy

HYPERTROPHIC PYLORIC STENOSIS

215. Congenital hypertrophic pyloric stenosis is associated with:
 a. Hypokalemia (PGI May 2011)
 b. Hypochloremic metabolic alkalosis
226. Metabolic abnormalities associated with infantile pyloric stenosis in early phase include all except: (DNB 2012)
 a. Hypokalemia b. Aciduria
 c. Hypochloremia d. None of the above

227. **Antral obstruction with vomiting is not characterized by:** (AIIMS June 98)
 a. Hypokalemia
 b. Hypochloremia
 c. Acidosis
 d. Hyponatremia
228. **Make the diagnosis of a 26-day-old infant presenting with recurrent non-bilious vomiting with constipation and loss of weight:** (AIIMS June 99)
 a. Esophageal atresia
 b. Choledochal cyst
 c. Ileal atresia
 d. Pyloric stenosis
229. **In congenital pyloric stenosis the defect usually lies in antral:** (AIIMS 78, PGI 83)
 a. Nerve fibers
 b. Circular muscle fibers
 c. Longitudinal muscle fibers
 d. Mucosa
230. **If the mucosa was accidentally opened at operation (Ramstedt) it is wise not to feed the child orally for:** (AMU 90)
 a. 12 Hours
 b. 24 Hours
 c. 48 Hours
 d. 1 week
231. **Which of the following is not a feature of ultrasound in CHPS?** (AIIMS Nov 2011)
 a. 95% sensitivity by ultrasound
 b. Thickness of pylorus > 4 mm
 c. Channel length > 16 mm
 d. High gastric residue
232. **The treatment of choice of hypertrophic pyloric stenosis of adult is:** (DPG 2011)
 a. Pyloromyotomy
 b. Pyloroplasty
 c. Billroth I gastrectomy
 d. Highly selective vagotomy
233. **Hypochloremia, hypokalemia and alkalosis are seen in:** (DNB 2012, AIIMS June 2003)
 a. Congenital hypertrophic pylori stenosis
 b. Hirschsprung's disease
 c. Esophageal atresia
 d. Jejunal atresia
234. **For a patient of gastric outlet obstruction, the OPD fluid management is:** (PGI June 2003)
 a. Normal saline
 b. Hypertonic saline
 c. Na⁺ bicarbonate to counteract aciduria
 d. Hypotonic saline without potassium
 e. Normal saline with potassium
235. **True about hypertrophic pyloric stenosis is all except:** (DNB 2007)
 a. Present at 4 weeks
 b. First born male is commonly affected
 c. Ramstedt operation is done
 d. Visible peristalsis is always seen
236. **String sign on barium meal is seen in:** (Recent Question 2015)
 a. Duodenal atresia
 b. Intestinal obstruction
 c. Duodenal ulcer
 d. Congenital hypertrophic pyloric stenosis
237. **Persistent vomiting in G.O.O. causes:** (PGI Dec 2002)
 a. Hyponatremic hyperchloremia occur
 b. Hyponatremia without hypochloremic alkalosis
 c. Hypokalemic metabolic alkalosis
 d. Paradoxical aciduria
238. **When peptic ulcer leads to gastric outlet obstruction, the most likely site of obstruction is?** (Orissa 2011)
 a. Antrum
 b. Pylorus
 c. Lesser curvature
 d. First part of duodenum
239. **Patients with protracted vomiting can develop:** (COMEDK 2006)
 a. Hypokalemic hypochloremic alkalosis
 b. Hyperkalemic hypochloremic acidosis
 c. Hypokalemic hyperchloremic alkalosis
 d. Hypokalemic hypochloremic acidosis
240. **A patient complains of occasional vomiting of food particles eaten a few days ago. His wife reports that his breath smells foul. The most likely diagnosis is:** (Kerala 89)
 a. Pyloric obstruction
 b. Carcinoma stomach
 c. Carcinoma esophagus
 d. Achalasia cardia
241. **The most common cause of gastric outlet obstruction in India is:** (All India 2006)
 a. Tuberculosis
 b. Cancer of stomach
 c. Duodenal lymphoma
 d. Peptic ulcer disease
242. **Regarding acute dilation of stomach which is incorrect:** (PGI 88)
 a. Occurs with fracture femur
 b. Occurs with plaster
 c. Resolves spontaneously without treatment
 d. Hypophosphatemia is to be avoided
243. **Commonest operation done for peptic ulcer with gastric outlet obstruction is:** (Kerala 89)
 a. Truncal vagotomy with pyloroplasty
 b. Highly selective vagotomy with pyloroplasty
 c. Truncal vagotomy with gastrojejunostomy
 d. Gastrojejunostomy
244. **A 35 years old male who had chronic duodenal ulcer for the last six years presents with worsening of symptoms loss of periodicity of symptoms, pain on rising in the morning sense of epigastric bloating and postprandial vomiting. The most likely cause of the worsening of his symptoms is the development of:** (DPG 2010, UPSC 96)
 a. Posterior penetration
 b. Gastric outlet obstruction
 c. Carcinoma
 d. Pancreatitis
245. **A patient with antral carcinoma repeatedly vomits. Not seen is:** (AIIMS 98)
 a. Acidosis
 b. Hypokalemia
 c. Hyponatremia
 d. Hypochloremia
246. **Most severe degree of alkalosis occurs in obstruction of:** (MAHE 98)
 a. Cardiac end
 b. Pylorus
 c. Ileocaecal region
 d. Colon
247. **All of the following are seen in chronic pyloric obstruction except:** (MCI March 2010)
 a. Alkaline urine
 b. Acidic urine
 c. Hypochloremia
 d. Hypokalemia
248. **Acute dilatation of stomach is not managed by:** (AIIMS June 97)
 a. N/G tube aspiration
 b. Stop oral feeds
 c. Surgery
 d. Fluid and electrolyte balance
249. **Which of the following is true about acute dilatation of stomach?** (PGI Dec 2005)
 a. Dilatation of stomach seen on X-ray
 b. Presents with vomiting
 c. Aspiration
 d. Immediately open the abdomen
 e. Atony of stomach

GASTRIC OUTLET OBSTRUCTION

BEZOARS

250. **Bezoar in the stomach present as:** (Punjab 2009)
 a. Melena b. Perforation
 c. GI obstruction d. Diarrhea
251. **The following are the complications of trichobezoars except:** (AIIMS 89, AMU 89)
 a. Hematemesis
 b. Perforation and peritonitis
 c. Obstruction
 d. Malignancy
252. **A female in her twenties presents with complaints of pain abdomen, abdominal distention and vomiting. On examination, she was found to have alopecia and a crepitus in the epigastrium. What is your diagnosis?** (AIIMS November 2014)
 a. Trichobezoar
 b. Carcinoma pyloric antrum
 c. Intestinal tuberculosis
 d. Rectus sheath hematoma
253. **True about trichobezoars are all except:** (MAHE 2006)
 a. It is caused by Trichuris
 b. It is a psychiatric manifestation
 c. Ball of hairs in the stomach
 d. Pulling the hair and sucking of hair is usually seen

STRESS GASTRITIS

254. **In case of upper GI bleed associated with stress gastritis all are true except:** (AIIMS GIS Dec 2009)
 a. Surgery should be done if transfusion requirements is > 6 units
 b. Vagotomy may be added
 c. Surgery involves anterior gastrotomy with ligation of bleeding ulcers and superficial erosions
 d. Total gastrectomy is rarely indicated
255. **In case of upper GI bleeding due to stress gastritis, all of the following decreases bleeding risk except:** (AIIMS GIS Dec 2009)
 a. Treatment of sepsis
 b. Improvement of BP
 c. Elective ventilation
 d. Correction of coagulopathy
256. **All are true about stress gastritis except:** (GB Pant 2011)
 a. Backflow H⁺ uptake by mucosal cells
 b. Decreased HCO₃ secretion
 c. Decreased mucosal blood flow
 d. Increased H. pylori infection
257. **Stress-induced ulcers are most commonly found in the:** (COMEDK 2010)
 a. Fundus of stomach
 b. Antrum of stomach
 c. Pyloric channel
 d. First part of duodenum
258. **Common sites of for Cushing ulcers include all of the following except:** (All India 99)
 a. Esophagus b. Stomach
 c. 1st part of duodenum d. Distal duodenum
259. **Most common site of Curling's ulcer:** (Recent Question 2014, AIIMS Nov 2008)
 a. Ileum b. Stomach
 c. Duodenum d. Esophagus
260. **Erosive gastritis commonly occurs at:** (JIPMER 93)
 a. Body b. Fundus
 c. Lesser curvature d. Antrum

261. Curling's ulcer is seen in:

- a. Burn patients (NEET 2013, DNB 2008, All India 88)
 b. Patients with head injuries
 c. Zollinger Ellison syndrome
 d. Analgesic drug abuse

262. Which of the following is not true of Curling's ulcer?

- a. Seen in burn patients (Karnataka 96)
 b. Are solitary penetrating ulcer
 c. Are shallow multiple erosions
 d. Has also been described in children after head injury or craniotomy

263. Stress ulcers is caused by all of the following except?

- a. Burns (APPG 2006)
 b. Cortisol therapy
 c. Penicillin therapy
 d. Pulmonary insufficiency

264. In a burn patient, the doctor is looking for curling ulcer. Which part should be examined? (AIIMS Nov 2013)

- a. 1st part of duodenum
 b. 2nd part of duodenum
 c. 3rd part of duodenum
 d. Junction between 2nd and 3rd part of duodenum

GASTRIC VOLVULUS

265. **All are true about organoaxial gastric volvulus except:**
 a. Borchardt's triad is present (AIIMS GIS Dec 2006)
 b. Usually associated with diaphragmatic defect
 c. Endoscopy usually derotate
 d. Occurs in elderly
266. **Borchardt's triad of acute epigastric pain violent retching and inability to pass a nasogastric tube is seen in patients with:** (J & K 2005)
 a. Achalasia cardia
 b. Acute gastric volvulus
 c. Jejuno gastric intussusceptions
 d. Hiatus hernia
267. **Borchardt's triad is characterized by the following except:**
 a. Inability to pass Nasogastric tube (MHSSMCET 2008)
 b. Vomiting
 c. Shock
 d. Diarrhea

STOMACH ANATOMY AND PHYSIOLOGY

268. **Criminal nerve of Grassi:** (ILBS 2011)
 a. Anterior branch of vagus at pylorus
 b. Anterior branch of vagus at cardia
 c. Proximal branch of posterior vagus
 d. Distal branch of posterior vagus
269. **Electrical pacemaker of stomach is situated in:** (Karnataka 2001)
 a. Fundus
 b. Body
 c. Incisura Angularis
 d. Gastroesophageal junction
270. **Function of thick gastric mucosa is:** (All India 97)
 a. Protects epithelium b. Neutralizes HCL
 c. Traps foreign particles d. None of the above
271. **G-cells are present mostly in:** (TN 91)
 a. Fundus b. Cardia
 c. Pyloric antrum d. Body

272. In which of the following organs submucosal glands are present? (COMEDK 2004)

- a. Colon
- b. Anal canal
- c. Duodenum
- d. Stomach

273. Ghrelin is responsible for: (COMEDK 2008)

- a. Stimulation of appetite
- b. Suppression of appetite
- c. Stimulation of sleep
- d. Suppression of sleep

274. Posterior gastric artery is a branch of: (JIPMER 2011)

- a. Left gastric artery
- b. Right gastric artery
- c. Splenic artery
- d. Hepatic artery

GASTRIC DIVERTICULUM

275. Diverticulum of the stomach: (PGI 79, UPCS 86)

- a. Pain is the main symptom
- b. Usually at cardiac end
- c. Usually on posterior surface
- d. Inversion is the satisfactory treatment
- e. All of the above

276. The most frequent symptom of gastric diverticulum is: (AIIMS 81, PGI 82)

- a. Epigastric lump
- b. Hematemesis
- c. Vomiting
- d. Pain

MISCELLANEOUS

277. Duodenal stricture is caused by: (PGI Dec 2002)

- a. Amebiasis
- b. T.B.
- c. CA pancreas
- d. Crohn's disease
- e. Giardiasis

278. Deficiency of the abdominal muscle is associated with: (PGI June 99)

- a. Eagle-Barrett syndrome
- b. Christopher syndrome
- c. Megacystitis
- d. Megaureter

279. Raised gastrin level without associated increase in acid secretion is seen in: (AIIMS Nov 94)

- a. Carcinoma stomach
- b. Gastrinoma

- c. Pernicious anemia
- d. G-cell hyperplasia

280. Hour glass stomach is seen in: (AIIMS 92)

- a. Gastric carcinoma
- b. Gastric ulcer
- c. Gastric Lymphoma
- d. Corrosive Strictures

281. Highest pickup for gastrojejunocolic fistula is by:

- a. Ba swallow
- b. Ba meal (J and K 2001)
- c. Ba enema
- d. Ba meal follow through

282. Duodenal adenocarcinoma: (PGI 2004)

- a. Most common small bowel carcinoma
- b. Type of periampullary carcinoma
- c. Jaundice and anemia - most common symptom
- d. Local resection - curative

283. For gastric lavage in an adult the stomach tube should be passed up to: (COMEDK 2004)

- a. Up to 20 cm
- b. Up to 30 cm
- c. Up to 40 cm
- d. Up to 50 cm

284. Thickened gastric folds on barium meal are seen in: (COMEDK 2010)

- a. Leiomyosarcoma
- b. Scleroderma
- c. Amyloidosis
- d. Linitis plastica

285. Duodenal diverticularization is indicated in: (PGI Nov 2011)

- a. Duodenal Fistula
- b. Duodenal polyp
- c. Duodenal ulcer
- d. Pancreatic injury
- e. Duodenal injury

286. Characteristic features of type A gastritis are all except: (MHSGMCET 2007)

- a. Gastric antrum is predominantly affected
- b. Chronic hypergastrinemia occurs
- c. Hypochlorhydria occurs
- d. Hypertrophy of gastric enterochromaffin like cells

287. Finney's stricturoplasty is done when the length of bowel stricture is: (MHSSMCET 2006)

- a. > 1 cm
- b. > 10 cm
- c. < 10 cm
- d. < 2.5 cm

288. In Hunt Lawrence pouch reconstruction, the length of pouch is: (MHSSMCET 2008)

- a. 10 cm
- b. 15 cm
- c. 20 cm
- d. 25 cm

EXPLANATIONS

H. PYLORI

1. Ans. a. Peptic ulcer; b. Adenocarcinoma; c. Atrophic gastritis; d. B cell lymphoma (Ref: Sabiston 19/e p1191-1194; Schwartz 10/e p293, 9/e p908-909; Bailey 26/e p1030-1031, 25/e p1051-1053; Shackelford 7/e p727-728; Harrison 18/e p1262-1264, 2441-2444)

HELICOBACTER PYLORI

- First successful culture of organism was done by **Marshall and Warren**^Q, who named it *Campylobacter pyloridis*.
 - Around **90% of duodenal ulcers** and **75% of gastric ulcer** are associated with **H. pylori infection**^Q.
 - Gastric antrum** is **MC site of colonization**^Q.
- It can live only in **gastric epithelium**, because only gastric epithelium expresses specific adherence receptors in vivo that can be recognized by organism.
 - Also found in **heterotopic gastric mucosa** in **proximal esophagus**, **Barrett's esophagus**, gastric metaplasia in the **duodenum**, **Meckel's diverticulum**, and heterotopic gastric mucosa in the **rectum**^Q.
- After the person is infected, usually in **childhood**, it is probably for life because **spontaneous remission is rare**^Q.
- There tends to be **inverse relationship** between **infection** and **socioeconomic status**^Q.
- Mechanisms by which **H. pylori** promote ulcer formation include **stimulation** of **gastrin** release, **inhibition** of **somatostatin** release, interruption of inhibitory vagal reflexes and **inhibition** of gastroduodenal **bicarbonate** secretion^Q.
- After **eradication** of the organism, ulcer **recurrence is rare**^Q.

Characteristic Features

- Spiral shaped**, **gram (-)ve rod**, **motile** with **lophotrichous flagella**^Q
- The sole source is human gastric mucosa
 - Biochemical reactions: **Catalase**, **oxidase** and **urease positive**^Q
- Grows well when incubated at **37°C** in **microaerophilic conditions**^Q.
- Media used include **Skirrow's medium**, **chocolate medium**^Q.

Pathogenesis

- Grows optimally at **pH 6.0-7.0**^Q and would be killed at pH within the gastric lumen.
- But it survives as it is found deep in mucus layer near epithelial surface, without invading mucosa where physiologic pH is present. It produces **potent urease**, which **provides ammonia** to **buffer acid**^Q.
- Major diseases associated H. pylori virulence factors are **vacuolating cytotoxin (Vac A)**^Q, and group of genes called **CagPa1**^Q.
 - H. pylori colonization decreases somatostatin producing cells** → ↑ **Gastrin** → ↑ **Acid** → **Gastric metaplasia** in **duodenum** → **Ulceration**^Q.

Clinical Manifestations

- 90% of duodenal ulcer** and **75% of gastric ulcer**^Q are related to H. pylori
- Increase risk of gastric adenocarcinoma**, **gastric MALT lymphoma**^Q.
- Extra-gastrointestinal pathologies that are linked include **ischemic heart disease** and **cerebrovascular disease**^Q.
 - CAG-A positive strain** is **protective for adenocarcinoma** esophagus but **can lead to SCC** of esophagus^Q.

Diagnosis

- Histologic visualization** of H. pylori is the **gold standard of diagnostic test**^Q (special stains used are **silver**, **Giemsa**, **Genta** or **Warthin starry stain**)^Q.
 - The **method of choice to diagnose** if endoscope is employed is **rapid urease test**^Q.
 - Serology** is the test of choice for **initial diagnosis** when endoscopy is not required.
 - After treatment, **Urea breath test** is the method of choice but should be performed **after 4 weeks** of therapy^Q.

Accuracy of Diagnostic Methods

- Chronic inflammation** on a gastric mucosal **biopsy** specimen is **100% sensitive test**^Q.
- Rapid Urease test** on a gastric mucosal biopsy specimen is **100% specific test**^Q.

ASSESSING SUCCESS OF TREATMENT/ERADICATION OF H. PYLORI

- Assessment should be done at least 4 weeks after completion of anti H. pylori therapy^Q.
- In the assessment of treatment success non invasive tests are normally preferred.
- Test of choice for documentation of eradication: Urea breath test^Q

Assessment of success of treatment	
Non invasive tests are preferred	Invasive tests are not preferred
<ul style="list-style-type: none"> • Urea breath test: Test of choice for documenting eradication^Q. • Stool antigen test: If UBT is not available, a stool antigen test should be considered for documenting eradication • Serological testing: Is not useful for purpose of documentation of eradication^Q as antibody titres fall slowly and often do not become undetectable 	<ul style="list-style-type: none"> • Biopsy based tests: (Biopsy urease test, Histology / Culture) are invasive tests based on endoscopic biopsy^Q. • These may be used to document eradication^Q but are not preferred for this purpose.

Assessment of Success of Treatment	
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- There is association of H. pylori infection and ABO blood group with pancreatic cancer^Q
- H. pylori and H. bilis infection increases the risk of CA GB^Q.

2. Ans. d. Gastric leiomyoma (Ref: Harrison 18/e p2443)

Diseases Associated with H. pylori		
Antral Predominant Gastritis	Corpus Predominant Atrophic Gastritis	Non-atrophic Pangastritis (Chronic Superficial gastritis)
<ul style="list-style-type: none"> • Duodenal ulcer^Q 	<ul style="list-style-type: none"> • Gastric ulcer^Q • Gastric adenocarcinoma^Q 	<ul style="list-style-type: none"> • MALT lymphoma^Q

3. Ans. b. Metaplastic polyp

4. Ans. a. Low grade MALT lymphoma

5. Ans. d. Warthin-Starry stain

6. Ans. b. Type B gastritis (Ref: Bailey 26/e p1031, 25/e p1053; Harrison 18/e p2458)

Chronic Gastritis	
Type A	Type B
<ul style="list-style-type: none"> • Autoimmune etiology^Q • Circulating antibodies to the parietal cell results in the atrophy of the parietal cell mass, resulting in hypochlorhydria and ultimately achlorhydria^Q. • Associated with pernicious anemia^Q • Primarily involves body and fundus^Q 	<ul style="list-style-type: none"> • Associated with H. pylori infection^Q • Primarily involves antrum^Q

- Type A: Autoimmune, Antibodies, Atrophy, Achlorhydria, Anemia
- Type B: Bacteria

7. Ans. b. Gastric metaplasia

8. Ans. b. Obligate parasite on gastric mucosa

9. Ans. d. Hypertrophic gastritis

10. Ans. a. Low grade MALT lymphoma

11. Ans. a. MALTomas

PEPTIC ULCER ETIOLOGY AND CLINICAL FEATURES

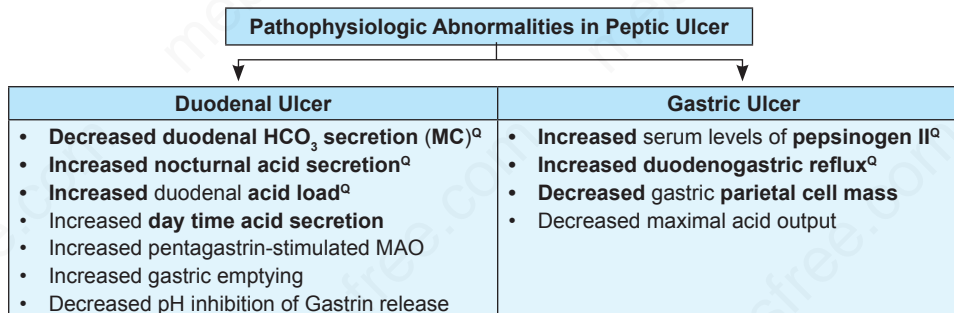
12. Ans. d. Pernicious anemia (Ref: Sabiston 19/ep1191-1201; Schwartz 10/e p1053-1073, 9/e p907-922; Bailey 26/e p1032-1036, 25/e p1054-1060; Shackelford 7/e p701-718)

Gastric Ulcer	Duodenal Ulcer
<ul style="list-style-type: none"> • Etiology: <ul style="list-style-type: none"> - Atrophic gastritis - H. pylori (75%)^a - Smoking, Alcohol^a - Lower socioeconomic status^a - Altered mucosal barrier function (NSAIDs)^a - There is either normochlorhydria or achlorhydria^a - Cirrhosis^a 	<ul style="list-style-type: none"> • Etiology: <ul style="list-style-type: none"> - Stress, anxiety: 'hurry, worry, curry'^a - H. pylori (90%)^a - NSAIDs, steroids^a - Blood group O+ve^a - Endocrine: Zollinger-Ellison syndrome, MEN-1, Cushing's syndrome, hyperparathyroidism^a - Alcohol, smoking, vitamin deficiency^a - Chronic pancreatitis, Cirrhosis^a
<ul style="list-style-type: none"> • MC Site: <ul style="list-style-type: none"> - Lesser curvature along the incisura angularis (Type 1)^a 	<ul style="list-style-type: none"> • MC site: <ul style="list-style-type: none"> - 1st part of duodenum (overall MC site for peptic ulcer)^a
<ul style="list-style-type: none"> • Clinical features: <ul style="list-style-type: none"> - Equal in both sexes - Pain in the epigastrium after taking food^a; relieved by vomiting - Pain is uncommon during night - Hematemesis common - Appetite good, but hesitant to eat as eating leads to pain that results in loss of weight^a 	<ul style="list-style-type: none"> • Clinical features: <ul style="list-style-type: none"> - More common in males^a - Pain in early morning, decreases after food (hunger pain^a) - Pain common during night^a - Melena common - Appetite good, eats more frequently and there is weight gain^a
<ul style="list-style-type: none"> • Features on Barium meal: <ul style="list-style-type: none"> - Niche on lesser curve with notch on greater curve^a - Regular/round margin of ulcer create spoke wheel pattern^a - Overhanging mucosa at the margins of a benign gastric ulcer projects inwards, towards the ulcer: Hampton's line^a - Converging mucosal folds at the base of the ulcer^a 	<ul style="list-style-type: none"> • Features on Barium meal: <ul style="list-style-type: none"> - Deformed or absent duodenal cap (because of spasm)^a - Appearance of trifoliate duodenum due to secondary duodenal diverticula^a
<ul style="list-style-type: none"> • Complications: <ul style="list-style-type: none"> - Perforation: MC complication of gastric ulcer (Into lesser sac)^a - Hour glass contracture: Exclusively in women due to cicatricial contracture of lesser curve ulcer^a - Tea pot stomach (hand bag stomach): Cicatrisation and shortening of the lesser curvature^a - Malignant transformation^a 	<ul style="list-style-type: none"> • Complications: <ul style="list-style-type: none"> - Bleeding: MC complication, on posterior wall, gastro-duodenal artery^a is most commonly involved - Perforation: More on anterior wall, if posterior, into pancreas - Gastric outlet obstruction due to pyloric stenosis-least common^a - Duodenal ulcers are benign (No malignant transformation)^a

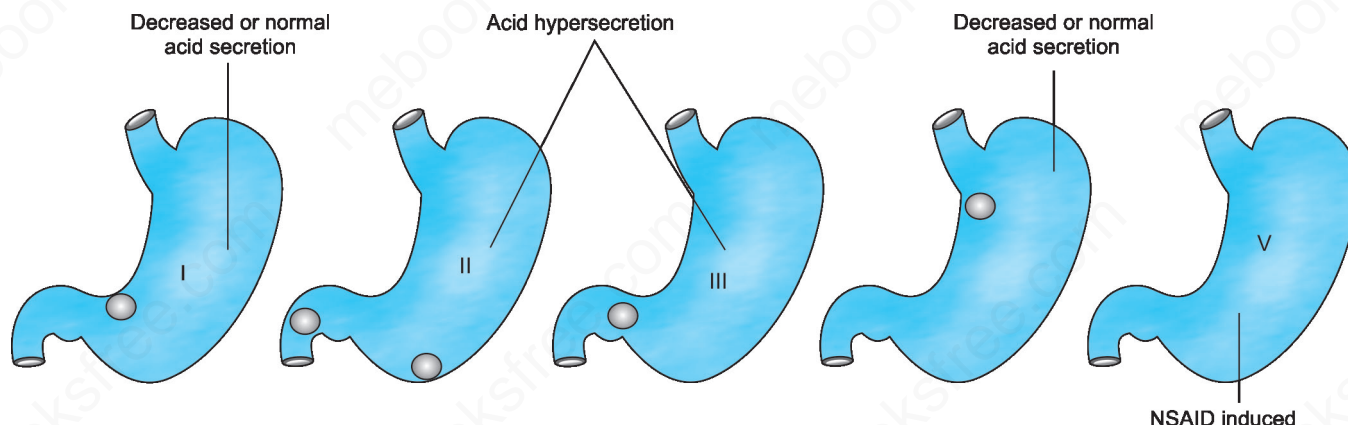
Specific Chronic Disorders Associated with PUD	
With strong associations	With possible associations
<ul style="list-style-type: none"> • Systemic mastocytosis^a • Chronic pulmonary disease^a • Chronic renal failure^a • Cirrhosis^a • Nephrolithiasis^a • Alpha1-antitrypsin deficiency^a 	<ul style="list-style-type: none"> • Hyperparathyroidism^a • Coronary artery disease • Polycythemia Vera • Chronic pancreatitis^a

13. Ans. c. Plummer-Vinson syndrome

14. Ans. b. Gastric acid; c. Alcohol abuse; e. Smoking

15. Ans. a. 1st part of duodenum

16. Ans. d. Lesser curvature near incisura angularis (Ref: Sabiston 19/e p1199)



Modified Johnson's Classification of Gastric Ulcer		
Type	Location	Acid Secretion
I	Lesser curvature, near incisura angularis (MC) ^Q	Low
II	Body of the stomach and duodenum ^Q	High ^Q
III	Prepyloric ^Q (within 2-3 cm of the pylorus)	High ^Q
IV	High on the lesser curve, near GE junction ^Q	Low
V	Anywhere, induced by medication (NSAIDs)	Low

GASTRIC ULCERS

- MC type: Type I gastric ulcer, is located near **angularis incisura** on the lesser curvature.
- NSAID ulcers (Type V) typically occur in the **antrum** but may be located anywhere in the stomach and may be multiple in origin.
- Type II and III: High acid secretion^Q
- Type I and IV: Normal or low acid secretion^Q
- Association:
 - Type I: Blood group 'A'^Q
 - Type II, III, and IV: Blood group 'O'^Q

17. Ans. a. Anterior aspect of the 1st part of duodenum

18. Ans. d. None (Ref: Harrison 18/e p2451-2452)

- Documented **eradication of H. pylori** in patients with PUD is associated with a dramatic **decrease in ulcer recurrence** to <10–20% as compared to 59% in GU patients and 67% in DU patients when the **organism is not eliminated**^Q.
- **Magnesium** containing drugs causes **diarrhea**^Q
- **Aluminium**-containing drugs often cause **constipation**^Q

19. Ans. b. 2, 3 and 4 only

20. Ans. c. Duodenal ulcer; d. Gastric ulcer (Ref: Harrison 18/e p2445)

CLINICAL FEATURES OF PEPTIC ULCER

- Epigastric pain described as a **burning** or **gnawing discomfort** can be present in both DU and GU^Q.
- The discomfort is also described as an ill-defined, aching sensation or as hunger pain.
 - The **typical pain pattern in DU** occurs **90 minutes to 3 hours after a meal** and is **frequently relieved by antacids or food**^Q.
 - Pain that **awakes the patient from sleep** (between **midnight** and **3 A.M.**) is the **most discriminating symptom**, with **two-thirds of DU patients** describing this complaint^Q.
- The **pain pattern in GU patients** may be different from that in DU patients, where **discomfort** may actually be **precipitated by food**^Q.
- Nausea and weight loss occur **more commonly in GU patients**.

21. Ans. b. Type III gastric ulcer

22. Ans. a. Type I

23. Ans. c. Type 3

24. Ans. a. Duodenal ulcer

PEPTIC ULCER COMPLICATIONS

25. Ans. c. Duodenotomy with ligation of bleeding vessels, truncal vagotomy and pyloroplasty (Ref: Sabiston 19/e p1195-1196; Schwartz 9/e p917-918; Bailey 26/e p1040-1042, 25/e p1062-1063; Shackelford (2012) 7/e p711-713)

Complications of Peptic Ulcer
• Intractability (Non-healing)
• Bleeding: MC complication of peptic ulcer ^Q
• Perforation: MC complication of gastric ulcer ^Q
• Gastric outlet obstruction (Rare)

TREATMENT OF BLEEDING DUODENAL ULCER {SHACKELFORD (2012) 7/E P711-713}

- The first priority during emergency surgery for a bleeding duodenal ulcer is control of the bleeding site^Q.
- If endoscopy has failed to precisely identify the source of hemorrhage, a pyloroduodenotomy may be necessary to inspect the duodenal bulb and gastric antrum^Q.
- The gastroduodenal artery is the usual source of bleeding, which should be controlled by placement of suture ligatures^Q.

- Once the bleeding has been addressed, a definitive acid-reducing operation may be performed^Q. With the identification of H. pylori, the utility of a vagotomy has been questioned. The data, however, suggest that, even in the era of H. pylori and our ability to eradicate it, a TV perhaps should be performed in those patients with a bleeding duodenal ulcer. There are several reasons for this recommendation:
 - Only 40% to 70% of patients with a bleeding duodenal ulcer are positive for H. pylori^Q.
 - H. pylori testing in the setting of an acute hemorrhage is less reliable^Q, with the CLO (Campylobacter-like organism) test having a false-negative rate of 18% versus 1% in those not actively bleeding
 - If an acid-reducing procedure is not performed, up to 50% of patients are at risk of recurrent bleeding^Q
 - Conflicting evidence that H. pylori treatment changes the risk of recurrent bleeding^Q.

- In contrast to other situations, the argument for performing a less aggressive operation in the face of massive bleeding exposes the patient to a high rebleeding risk post-surgery^Q.

- Because it is simple to open the pylorus in a longitudinal fashion, TV with pyloroplasty is the most frequently used operation for bleeding duodenal ulcer^Q.

- The pyloric vein of Mayo is virtually always present on the anterior surface of the inferior pylorus^Q.

26. Ans. b. Gastroduodenal artery (Ref: Sabiston 19/e p1195-1196; Schwartz 10/e p1053-1073, 9/e p917-918; Bailey 26/e p1042-1043, 25/e p1064; Shackelford 7/e p711-714)

BLEEDING PEPTIC ULCER

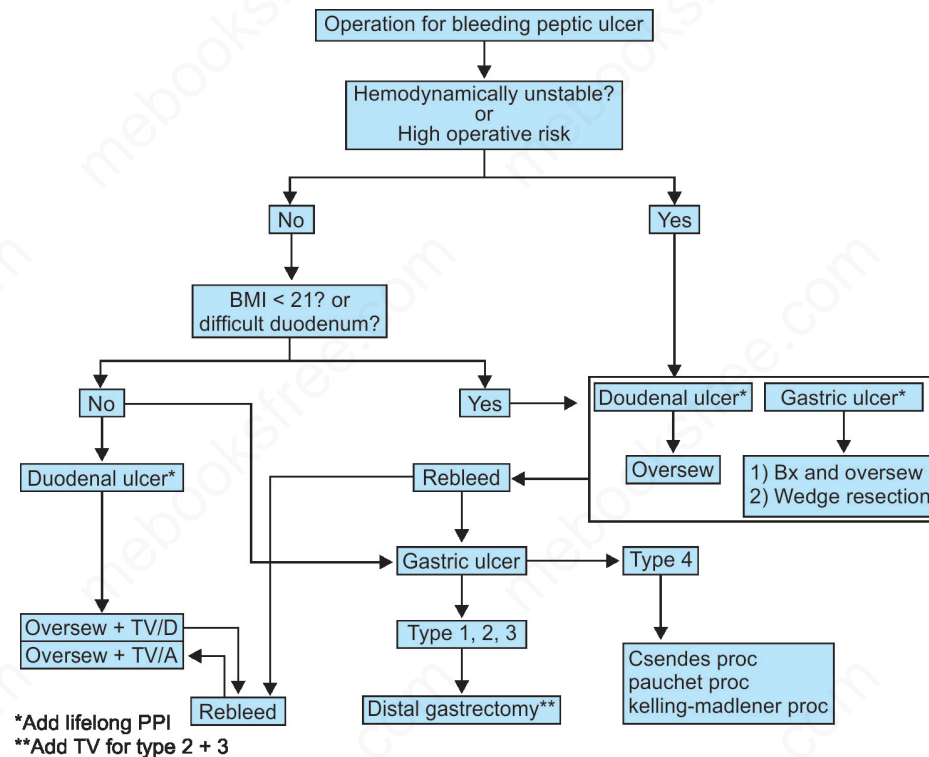
- Bleeding: MC indication for operation and principal cause of death in PUD patients^Q.

- The most significant hemorrhage occurs when duodenal or gastric ulcers penetrate into branches of the gastroduodenal artery or left gastric artery, respectively^Q.

- Incidence of peptic ulcer bleeding decreased over past decade, but mortality was stable for both gastric and duodenal ulcer bleeding, higher in patients of advanced age.
- Cause of death: Multiple-system organ failure (not the exsanguinating hemorrhage)

Treatment

- Irrigation with room temperature saline to lyse red cells in an effort to return clear fluid and to allow for the performance of endoscopy.
- Figure-of-eight sutures to ligate the gastroduodenal artery^Q. A 'U' stitch is placed in the ulcer base to occlude pancreatic branches of the gastroduodenal artery.
- Truncal vagotomy and pyloroplasty is the most frequently used operation for bleeding duodenal ulcer^Q



27. Ans. c. Perforation

28. Ans. b. Duodenum

29. Ans. a. Omental bursa (lesser sac) (Ref: Bailey 26/e p1040, 25/e p1062; Schwartz 9/e p921)

- Gastric ulcers perforate into the lesser sac, which can be particularly **difficult to diagnose**^Q.
- A gastric ulcer perforates into the lesser sac^Q, then no generalized peritonitis can be seen but misleading symptoms may appear.

30. Ans. a. Gastric ulcer with bleeding (Ref: Harrison 18/e p2444)

- Hypotension in an **elderly patient** with history of **aspirin intake** and complaints of **black stool** suggests **GI bleeding** due to **drug induced gastritis**.
- Bleeding peptic ulcer due to NSAIDs is **more frequent** in individuals **>60 years** of age due to increased use of NSAIDs in this group.

31. Ans. a. IV fluids; c. Immediate surgery; e. IV pantoprazole (Ref: Sabiston 19/e p1196; Schwartz 10/e p1068, 9/e p921; Bailey 26/e p1041-1042, 25/e p1062-1063; Shackelford 7/e p713-716)

MANAGEMENT OF PERFORATED PEPTIC ULCER

- Perforated peptic ulcer usually presents as an **acute abdomen**.
- Initially, a **chemical peritonitis** develops from the **gastric and/or duodenal secretions**, but **within hours** a **bacterial peritonitis** supervenes.
- **Fluid sequestration** into the **third space** of the inflamed peritoneum can be impressive, and **fluid resuscitation is mandatory**^Q.
- The patient is in **obvious distress**, and the abdominal examination shows **peritoneal signs**.
- Usually, **marked involuntary guarding** and **rebound tenderness** is evoked by a gentle examination.

Diagnosis

- Upright chest x-ray shows **free air** in about **80%**^Q of patients.

Treatment

- Nasogastric aspiration, analgesia and antibiotics, resuscitated with isotonic fluid, antisecretory agents (PPI, H₂ receptor antagonist)

- Surgery is almost always indicated^Q.
- Sometimes, the perforation has sealed spontaneously by the time of presentation, and surgery can be avoided if the patient is doing well.
- Non-operative management in:
 - Objective evidence that the leak has sealed (i.e., radiologic contrast study)^Q
 - Absence of clinical peritonitis^Q.

32. Ans. b. 75% (Ref: Schwartz 9/e p2644)

- Upright chest x-ray shows free air in about 80% of patients of perforated peptic ulcer.

33. Ans. b. Hemorrhage

34. Ans. b. X-ray abdomen

35. Ans. c. Dilution of acid in the peritoneal cavity

36. Ans. a. Omental bursa

37. Ans. c. Basal pneumonia (Ref: Shackelford 7/e p714)

38. Ans. a. Gastroduodenal artery

39. Ans. c. Proton pump inhibitors

PEPTIC ULCER DIAGNOSIS AND TREATMENT

40. Ans. a. Before breakfast (Ref: Sabiston 19/e p1194; Schwartz 10/e p971,972,979, 9/e p913; Bailey 26/e p1035, 25/e p1057)

PPIs are taken before breakfast.

PROTON PUMP INHIBITORS

- Most potent antisecretory agents, substituted benzimidazoles, also known as the proton pump inhibitors^Q.
- Covalently bind to the catalytic subunit of the proton pump and negate all types of acid secretion^Q
- PPIs provide more complete inhibition of acid secretion than the H₂-receptor antagonists^Q.

- Inhibition of acid secretion is also more prolonged because of the irreversible inhibition of the enzyme caused by the covalent bond to the proton pump^Q.
 - PPIs are more effective during the day, generally prescribed before breakfast^Q.
- PPIs require an acidic environment^Q within the gastric lumen in order to become activated and bind to the proton pump at the secretory canaliculus.

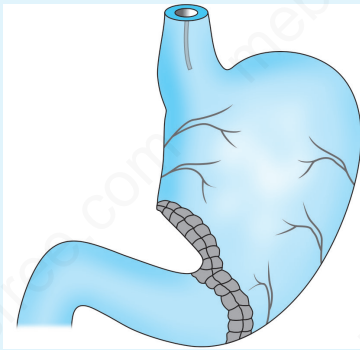
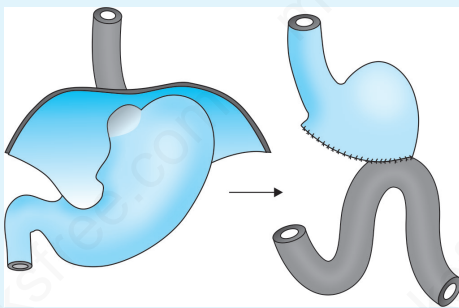
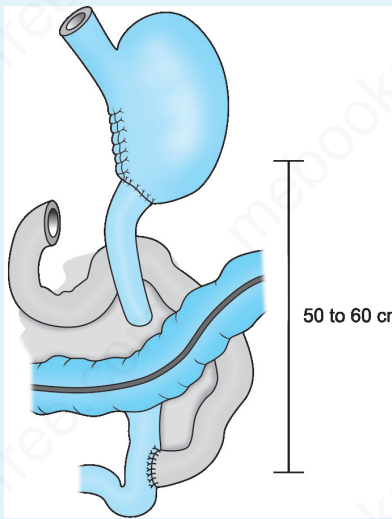
- Utilization of antacids or H₂-receptor antagonists in combination with PPIs could have deleterious effects by promoting an alkaline environment and thereby preventing activation of the PPI^Q.
- Consequently, antacids and H₂-receptor antagonists should not be used in combination with PPIs^Q.

41. Ans. a. Highly selective vagotomy (Ref: Sabiston 19/e p1197-1198; Schwartz 10/e p1093-1094, 9/e p913-917; Bailey 26/e p1037-1038, 25/e p1058-1059; Shackelford 7/e p720-729)

Types of Vagotomy		
Highly Selective Vagotomy	Vagotomy and Drainage	Vagotomy and Antrectomy
<ul style="list-style-type: none"> • Procedure of choice for chronic or intractable duodenal ulcers^Q • Nerves of Latarjet supplying the antrum are preserved^Q (and hence gastric motility) 	<ul style="list-style-type: none"> • TV is performed by division of left and right vagus nerves above the hepatic and celiac branches^Q just above the GE junction. 	<ul style="list-style-type: none"> • Procedure of choice for recurrent duodenal ulcers^Q • Lowest recurrence rate^Q
<ul style="list-style-type: none"> • Drainage procedure is not required^Q • Lowest mortality rate and side effects^Q • Minimal chances of dumping syndrome and gastric atony^Q • Relatively high recurrence^Q 	<ul style="list-style-type: none"> • MC operation performed for duodenal ulcer^Q • Intermediate morbidity and recurrence rate^Q 	<ul style="list-style-type: none"> • High mortality and morbidity^Q

42. Ans. a. Nerves of Latarjet

43. Ans. a. Billroth I operation (Ref: Sabiston 19/e p1198-1199; Schwartz 10/e p1120, 9/e p916; Bailey 26/e p1036-1038, 25/e p1059-1060; Shackelford 7/e p733-737)

Operations for Gastric Ulcer		
Billroth-I Gastrectomy	Billroth-II Gastrectomy	
<ul style="list-style-type: none"> • Gastroduodenostomy^Q • Performed when there is a sufficient portion of the upper duodenum remaining^Q • Remaining portion of the stomach is reattached to the duodenum^Q 	<ul style="list-style-type: none"> • Loop gastrojejunostomy^Q • Performed if the stomach cannot be reattached to the duodenum^Q • Remaining portion of the duodenum is sealed off, a hole is cut into the jejunum and the stomach is reattached^Q at this hole. 	
		
Billroth I (Gastroduodenal) anastomosis	Billroth II Gastrectomy (Loop Gastrojejunostomy)	Roux-en-Y Gastrojejunostomy

POLYA GASTRECTOMY

- A type of **posterior gastroenterostomy** which is a **modification of Billroth II** operation.
- Resection of 2/3 of the stomach with **blind closure of the duodenal stump** and **retrocolic anastomosis** of the full circumference of the open stomach to jejunum^Q.

44. Ans. a. Finney's Pyloroplasty (Ref: Sabiston 19/e p1251-1252; Schwartz 9/e p916; Shackelford 7/e p895)

Finney Pyloroplasty is performed in patients with a J-shaped stomach or extensive scarring and narrowing of a significant portion of the duodenal bulb.

DRAINAGE PROCEDURES IN PEPTIC ULCERS

- **Heineke-Mikulicz Pyloroplasty:** Most commonly performed drainage procedure^Q.
- **Finney Pyloroplasty:** Performed in patients with a J-shaped stomach or extensive scarring and narrowing of a significant portion of the duodenal bulb^Q.
- **Jaboulay Gastroduodenostomy:** It involves an anastomosis of the distal end of the stomach to the first and second portions of the duodenum, done in severely scarred or deformed pylorus or duodenal bulb^Q.

45. Ans. d. 80 (Ref: Sabiston 19/e p1191; Schwartz 9/e p908; Harrison 18/e p2442)

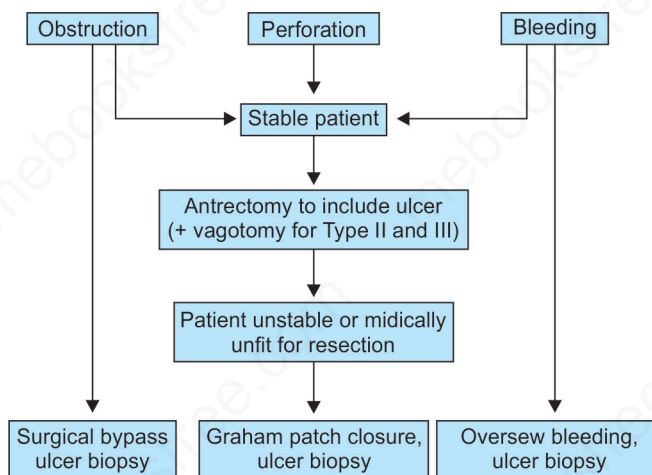
ASSOCIATION OF H PYLORI WITH PEPTIC ULCER

- Harrison: 30-60% GUs and 50-70% of DUs
- Sabiston: 75% GUs and 90% DUs
- Schwartz: 70-90% GUs and 90% DUs

46. Ans. c. Vitamin B12 deficiency

47. Ans. a. Pouchet procedure; b. Kelling-Madlener operation; c. Csendes procedure (Ref: Sabiston 19/e p1200; Schwartz 9/e p913-916; Bailey 26/e p1036-1038, 25/e p1059-1060; Shackelford 7/e p708-710)

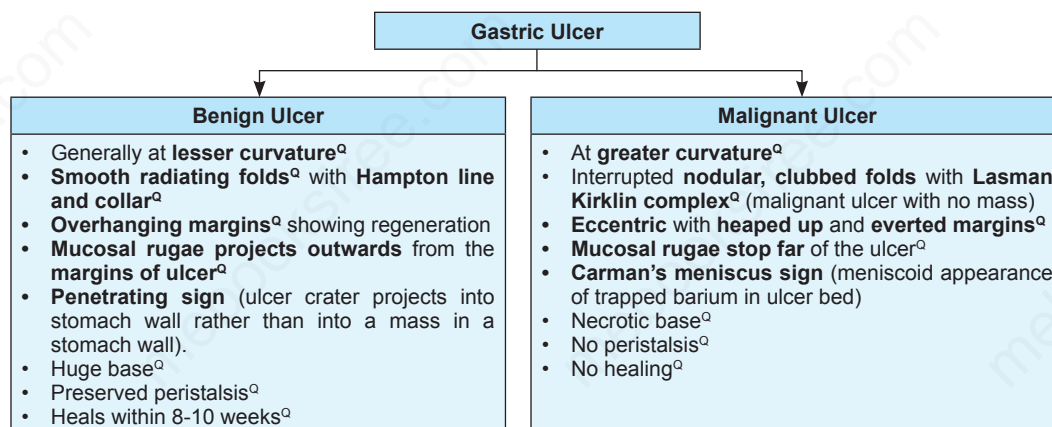
Elective Gastric Ulcer Operations	
Type	Procedure
Type I	• Distal gastrectomy with Billroth I or II reconstruction ^a
Type II and III	• Truncal vagotomy plus antrectomy ^a
Type IV	• Schoemaker procedure ^a • Pouchet procedure ^a • Kelling-Madlener procedure (For unstable patients ^a) • Csendes procedure (For stable patients ^a)



48. Ans. a. Proximal two-thirds of stomach

49. Ans. c. Type IV ulcer most common type; e. 30% GU are associated with malignancy (Ref: Harrison 18/e p2446; Chandrasoma Taylor 3rd/582, 597)

- MC type of gastric ulcer is Type I, is located near **angularis incisura** on the **lesser curvature**^a.
- **H. pylori** colonization is seen in 75-80% of patients with gastric ulcer^a.
- A chronic duodenal ulcer never turns malignant, while less than 1% of chronic gastric ulcer may transform into carcinoma.



GASTRIC ULCER ON DOUBLE CONTRAST UPPER GI SERIES

Benign Ulcer:

- In benign gastric ulcer, **mucosal folds radiate from crater** in sponge like manner^a.
- Typically **benign ulcer craters** extend **beyond the luminal margin** of the stomach and have **radiating gastric folds**, **ulcer mound** due to mucosal edema, **ulcer collar**^a (a lucent ring that separates ulcer crater from gastric mucosa), **Hampton's line** and **Penetrating sign**^a (ulcer crater projects into stomach wall rather than into a mass in a stomach wall).

Malignant Ulcer:

- In **malignant ulcers**, gastric folds are **amputated** or **clubbed** and do **not reach** the **edge** of ulcer crater have **parallel gastric folds**.
- Malignant ulcers are characterized by **Carman's meniscus sign**^Q (meniscoid appearance of trapped barium in ulcer bed), **intraluminal crater**^Q (crater erodes into the mass within the gastric cavity) and **Kirklin complex**^Q (heaped up margins touching bed causes lucent rim around ulcer on barium meal).

Remember:

- **Benign BPH:** (Benign ulcer- Penetrating sign and Hampton's hump)
- **Malignant CIK:** (Carman's meniscus sign, Intraluminal crater, Kirklin complex)

50. Ans. c. Anti-H. pylori drugs must be included in the treatment regime; d. H. pylori is known to increase incidence of gastric malignancies

51. Ans. d. Ipratropium (Ref: Sabiston 19/e p1194; Schwartz 10/e p1041-1044, 9/e p913-915; Bailey 26/e p1035, 25/e p1057)

DRUGS THAT REDUCE GASTRIC ACID SECRETION

- Proton pump inhibitors^Q
- Muscarinic-3 receptors antagonists^Q
- Somatostatin^Q
- Histamine-2 receptor antagonists^Q
- Prostaglandin E-1 receptor agonists^Q (Misoprostol)

- **Alginates**^Q are combined with antacids for use in **reflux esophagitis** because they are believed to **increase adherence** to esophageal mucosa.

52. Ans. a. Hypotonic duodenography; b. Barium meal; d. Upper GI endoscopy (Ref: Sabiston 19/e p1193-1194; Schwartz 10/e p207, 9/e p911)

DUODENAL ULCERS

- Duodenal ulcers are best diagnosed by upper GI endoscopy^Q.
- Double contrast barium studies also yield good results
- Barium studies done for duodenal ulcers:
 - Double contrast **barium meal**
 - Double contrast **hypotonic duodenography**

53. Ans. d. Highly selective vagotomy

54. Ans. a. Truncal vagotomy and antrectomy

55. Ans. c. Truncal vagotomy and antrectomy

56. Ans. d. Duodenal erosion (Ref: Harrison 13th (1994) /1351)

ENDOSCOPY

- Fiber endoscopy is especially useful in visualizing **postbulbar ulcers**, **giant duodenal ulcers**, and **stomal ulceration** after partial gastrectomy, all of which can be missed by X-ray.

57. Ans. d. Typical periodicity

58. Ans. b. Truncal vagotomy and antrectomy

59. Ans. c. Vagotomy + repair of perforation (Ref: Sabiston 19/e p1195-1196; Schwartz 9/e p916-922; Bailey 26/e p1033-1034, 25/e p1054-1055; Shackelford 7/e p701-708)

Duodenal Ulcer	
Complications	Treatment
Intractable	Highly selective vagotomy ^Q
Bleeding	Truncal vagotomy with pyloroplasty ^Q and oversewing of bleeding vessel
Perforated	Omental patch repair (with Truncal vagotomy in stable patients ^Q)
Obstruction	(Rule out malignancy) <ul style="list-style-type: none"> • Truncal vagotomy with antrectomy is ideal procedure^Q • Truncal vagotomy with gastrojejunostomy in cases of inflammation and scarring of duodenal bulb^Q
Intractable or Bleeding	Type I: Distal gastrectomy ^Q Type II or III: Truncal vagotomy with antrectomy ^Q

Complications	Treatment
Perforated	Type I: <ul style="list-style-type: none"> Distal gastrectomy in stable patients^Q Biopsy and patch closure in unstable patients^Q Type II and III: Patch closure in unstable patients (Truncal vagotomy with antrectomy in stable patients) ^Q
Obstruction	Truncal vagotomy with antrectomy ^Q (Rule out malignancy)

60. Ans. d. Duodenal ulcer (Ref: Shackelford 7/e p704, 708; Schwartz 9/e p915)

OPERATION FOR PEPTIC ULCER

- Hill and Baker procedure: Posterior truncal vagotomy with anterior HSV^Q.
- Taylor Procedure: Posterior truncal vagotomy with anterior lesser curve seromyotomy^Q. The technique is very suitable for a laparoscopic approach.

61. Ans. d. Graham's omentum patch repair 62. Ans. a. Proximal two-thirds of stomach
 63. Ans. b. Vagotomy and antrectomy 64. Ans. c. Kelling Madlener procedure
 65. Ans. c. Pyloroplasty done 66. Ans. a. Vagotomy + antrectomy
 67. Ans. a. Megaesophagus treatment by esophageal mucosal resection

- Ménétrier's disease is associated with hypochlorhydria (no use of HSV).
- Giant gastric ulcers should be treated with truncal vagotomy + antrectomy.
- Vagotomy, irrespective if truncal or highly selective, only has a temporary effect in stress ulceration, consisting of multiple, punctate, superficial erosions, confined initially to the proximal gastric mucosa.

68. Ans. d. HSV

GASTRECTOMY AND COMPLICATIONS

69. Ans. a. Iron deficiency anemia (Ref: Sabiston 19/e p1202-1204; Schwartz 10/e p1090-1094, 9/e p942-946; Bailey 26/e p1038-1040, 25/e p1060-1062; Shackelford 7/e p757-765)

MC metabolic complication after gastrectomy is iron deficiency anemia.

Postgastrectomy/Vagotomy Syndrome		
Secondary to Gastric Resection	Secondary to Gastric Reconstruction	Postvagotomy Syndrome
<ul style="list-style-type: none"> Dumping syndrome^Q Metabolic disturbances^Q 	<ul style="list-style-type: none"> Afferent loop syndrome^Q Efferent loop obstruction^Q Alkaline reflux gastritis^Q Retained antrum^Q syndrome 	<ul style="list-style-type: none"> Postvagotomy diarrhea^Q Postvagotomy gastric atony^Q Incomplete vagal transection^Q

70. Ans. a. Vitamin B₁₂ deficiency (Ref: Sabiston 19/e p1203; Schwartz 9/e p946; Bailey 26/e p1040, 25/e p1060-1062; Shackelford 7/e p759-760)

METABOLIC COMPLICATIONS AFTER GASTRECTOMY

- Metabolic complications are more common and serious after partial gastrectomy^Q than after vagotomy.
- More common in Billroth II^Q > Billroth I procedure
- Severity is directly related to the extent of gastric resection^Q.
- MC metabolic defect appearing after gastrectomy: Anemia^Q

ANEMIA

- MC metabolic defect appearing after gastrectomy: Anemia^Q
- Iron deficiency anemia (IDA) is more common than vitamin B₁₂ deficiency anemia^Q.

Iron deficiency anemia:

- More than 30% of patients undergoing gastrectomy suffer from IDA^Q
- Cause: Combination of decreased iron intake, impaired iron absorption, and chronic blood loss^Q

- Addition of **iron supplements** to the patient's diet **corrects IDA**^Q.

Megaloblastic anemia:

- **Megaloblastic anemia** can occur when **>50%**^Q of the **stomach is removed** such as occurs during **subtotal gastrectomy**^Q.
- **Vitamin B₁₂ deficiency** occur **secondary to poor absorption** of the substance owing to **lack of intrinsic factor secretion** in the gastric juice.
- **Treatment: Intramuscular injections of cyanocobalamin**^Q every 3 to 4 months indefinitely because its administration orally is not a reliable route.

Folate deficiency:

- **Folate deficiency** is **rare** after gastric resection
- **May coexist with** either an iron or vitamin B₁₂ deficiency.
- Usually be corrected by **dietary supplementation**.

Impaired Absorption

- Common metabolic disturbance after gastric resections is **impaired absorption of fat**.
- **Steatorrhea** may occur as a result of **inadequate mixing of bile salts and pancreatic lipase** with ingested fat **because of the duodenal bypass**^Q.
- **Deficiency in uptake of fat-soluble vitamins** may also occur^Q.
- **Osteoporosis and osteomalacia** have also been observed after gastric resection and appear to be **caused by deficiencies in calcium**^Q.
- If **fat absorption** is also present, the **calcium malabsorption** is further **aggravated** because **fatty acids bind calcium**^Q.
- **Treatment: Calcium supplements with vitamin D**^Q

71. Ans. c. Vitamin B 12 deficiency

72. Ans. c. HSV

73. Ans. d. Osteomalacia

74. Ans. b. Presence of hypertonic content in small intestine (Ref: Sabiston 19/e p1203; Schwartz 10/e p1090-1092, 9/e p942-944; Bailey 26/e p1039, 25/e p1060-1061; Shackelford 7/e p757-759)

DUMPING SYNDROME

- Dumping syndrome refers to a constellation of **post-prandial symptoms** occurring due to **accelerated emptying** (dumping) of **hyperosmolar stomach contents** into the small bowel.
- It is usually seen in operation which destroys the pyloric sphincter (i.e **gastrectomy, antrectomy and drainage procedures**)^Q.
- It also affects a small percentage of patients with highly selective vagotomy due to loss of receptive relaxation of stomach.

Dumping Syndrome	
Early Dumping	Late Dumping
<ul style="list-style-type: none"> • It occurs immediately after meals (after 15-30 minutes)^Q • Dumping of hyperosmolar contents into the small bowel^Q results in rapid fluid influx from the circulation into the gastrointestinal tract. This leads to acute intestinal distention and peripheral and splanchnic vasodilatation^Q. • This gives rise to vasomotor and abdominal symptoms: Epigastric fullness, sweating, light headedness, tachycardia, diarrhea. • Symptoms can be ameliorated by lying down and saline infusion^Q. 	<ul style="list-style-type: none"> • It is seen 2-3 hrs after meal^Q • Occurs due to reactive hypoglycemia^Q. • The carbohydrate load in the small bowel causes a rise in plasma glucose, which in turn, causes high insulin levels leading to hypoglycemia. • Symptoms are relieved by administration of sugar^Q.

Management

- **Dietary management:** Diet therapy is done to reduce jejunal osmolality.
 - **Multiple small meals**, food **low in carbohydrate** and **rich in fat and proteins** are taken^Q.
 - **Liquids during meals** should be **avoided**^Q.
- **Somatostatin analogues (octreotide):**
 - Diet therapy is usually successful but if it fails, the patient is started on octreotide.
- **Surgery:**
 - Surgery is **rarely required**^Q as most of the patients improve with time, dietary management and Octreotide.
 - **Surgical procedures** used to treat dumping are:
 - ❖ Use of an **antiperistaltic loop of jejunum** between the **residual gastric pouch** and **intestine**
 - ❖ Conversion of **Billroth II to Billroth I** anastomosis
 - ❖ Conversion to **Roux-en-Y-anastomosis**.

75. Ans. c. Starch is beneficial
76. Ans. d. Surgery is usually indicated

- Surgery is rarely required in dumping or post-cibal syndrome, as most of the patients improve with time, dietary management and octreotide^Q.

77. Ans. b. 4th day (Ref: Shackelford 7/e p930, 944)

DUODENAL STUMP BLOWOUT

- Duodenal stump blowout is **massive leakage** from **duodenal stump** following **Billroth-II** gastrectomy^Q.

Clinical Features:

- It usually occurs on **4th to 7th** post-operative day^Q.
- Usually presents as sudden intense thoracoabdominal pain, sudden elvation in pulse and temperature or generalized deterioration of condition.

Treatment:

- **Adequate drainage** must be instituted **immediately**, which is done by putting a **catheter** through an incision **below the right costal margin**^Q.
- **TPN** should be instituted and attention should be directed towards **fluid and electrolyte therapy**^Q.
- **Fistula closure** can be anticipated **within 2-3 weeks**^Q.

78. Ans. d. Fluid loss
79. Ans. b. Loss of storage capacity
80. Ans. d. Anastomotic hemorrhage
81. Ans. a. Billroth-II
82. Ans. c. Gastrojejunocolic fistula (Ref: Shackelford 6/e p1094, 1110; Bailey 26/e p1039, 25/e p1060)

GASTROJEJUNOCOLIC FISTULA

- Gastrojejunocolic fistula may form between the **transverse colon** and the **upper jejunum** after a **Billroth II** surgical procedure^Q. (The Billroth procedure attaches the jejunum to the remainder of the stomach).

Clinical Features:

- The symptoms of GJF are **diarrhea**, **epigastric pain** and discomfort, **gastrointestinal bleeding**, **feculent eructation**, **fecal vomiting**, **weight loss** and weakness^Q.
- **Anemia**, **leukocytosis**, **electrolyte disturbances** and **hypoalbuminemia** are common laboratory findings^Q.

Diagnosis:

- Barium enema is diagnostic of GJC fistula^Q.

- Investigations used: Barium enema and endoscopy^Q
- The success rate of barium enema in correctly diagnosing the fistula is 95-100%^Q

Treatment:

- The **historical approach** was **2-3-staged operations** even involving a **preliminary diversion colostomy** in order to **ameliorate the nutritional status** of the patient and to **decrease mortality**^Q
- Three staged operation: (1) colostomy (2) resection of the fistula (3) colostomy closure
- Today, because of the **parenteral** and **enteral support treatments** and the developments in intensive care conditions, **one-stage resection** can be applied^Q

83. Ans. c. Billroth-I gastrectomy
84. Ans. a. Clean contaminated wound (Ref: Sabiston 19/e p286; Schwartz 9/e p219)

Surgical Wound Classification According to Degree of Contamination	
Wound Class	Definition
Clean	<ul style="list-style-type: none"> • An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or infected urinary tract is not entered^Q. • Wounds are closed primarily^Q and, if necessary, drained with closed drainage. • Surgical wounds after blunt trauma^Q should be included in this category if they meet the criteria
Clean-contaminated	<ul style="list-style-type: none"> • An operative wound in which the respiratory, alimentary, genital, or urinary tract is entered^Q under controlled conditions and without unusual contamination^Q

Contaminated	<ul style="list-style-type: none"> • Open, fresh, accidental wounds^Q • In addition, operations with major breaks in sterile technique or gross spillage from the gastrointestinal tract and incisions in which acute, nonpurulent inflammation is encountered^Q are included in this category
Dirty	<ul style="list-style-type: none"> • Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera^Q. • This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation^Q

85. Ans. a. Hernia surgery

86. Ans. c. Complication of partial gastrectomy

87. Ans. c. Somatostatin analogue (Ref: Schwartz 9/e p943-944; Bailey 26/e p1039, 25/e p1061; Shackelford 7/e p760)

POSTVAGOTOMY DIARRHEA

- About 30% or more of patients **suffer from diarrhea after gastric surgery^Q**.
- For most patients, it is **not severe** and **usually disappears within the first 3 to 4 months^Q**.
- **Vagotomy** is associated with **alterations in stool frequency^Q**.
- **Truncal vagotomy** results in **increased frequency of daily bowel movements in 30-70% of patients^Q**.

Treatment:

- **Postvagotomy diarrhea resolves over time** in most of the patients^Q.
- If symptoms fail to resolve:
 - **Cholestyramine^Q** (an anionic exchange resin that absorbs bile salts rendering them unabsorbable and inactive)
 - **Octreotide^Q** can be used for **severe postvagotomy diarrhea**

88. Ans. c. Billroth (Ref: Sabiston 19/e p1198; Schwartz 10/e p1120, 9/e p916; Bailey 26/e p1036-1038, 25/e p1057-1058; Shackelford 7/e p731-742)

GASTRECTOMY

- The **first successful gastrectomy** was performed by **Theodor Billroth^Q** in 1881 for **cancer of the stomach**.
- Historically, **gastrectomies were used to treat peptic ulcers**. These are **now usually treated with antibiotics**, as it was recognized that they are usually due to *Helicobacter pylori*.
- In the past a **gastrectomy** for peptic ulcer disease **was often accompanied by a vagotomy, to reduce acid production**, nowadays, **managed with PPIs**.
- Gastrectomies are performed to **treat cancer and perforations** of the stomach wall.
- In **severe duodenal ulcers** it may be necessary to **remove the pylorus and the upper portion of the duodenum**.

- If there is a **sufficient portion of the upper duodenum remaining**, a **Billroth I procedure** is performed, where the **remaining portion of the stomach is reattached to the duodenum** before the bile duct and the duct of the pancreas (**Gastroduodenostomy**)^Q

- If the **stomach cannot be reattached to the duodenum**, a **Billroth II** is performed, where the **remaining portion of the duodenum is sealed off**, a hole is cut into the jejunum and the **stomach is reattached at this hole (Loop gastrojejunostomy)**.

89. Ans. b. Increased intestinal secretion

90. Ans. c. Hyperglycemia

91. Ans. d. Large volume of hyperosmotic fluid in the intestine

UPPER GI BLEED

92. Ans. b. Low urine output (Ref: Sabiston 19/e p1161; Schwartz 9/e p912-915)

BLEED RISK CLASSIFICATION

- To **predict risk of rebleeding and mortality in upper GI bleed**
- Predicts **risk on initial presentation** based on **five criteria**:
 - **Ongoing bleeding^Q**
 - **Low systolic blood pressure^Q** (< 100 mm Hg)
 - **Elevated PT^Q** (> 1.2 times the control value)
 - **Altered mental status^Q**
 - Presence of an **unstable comorbid disease^Q** (any ongoing organ system abnormality that would require ICU admission e.x. myocardial ischemia, hepatic dysfunction).

To Predict Rebleeding and Mortality in Peptic Ulcer

Blatchford scale
<ul style="list-style-type: none"> The Blatchford scale uses clinical parameters only and is calculated from patient's hemoglobin, blood urea, systolic blood pressure and pulse rate on admission and the presence or absence of melena or syncope as well as of evidence of cardiac or hepatic failure. (HUSP + Melen/Syncope + Cardiac/Hepatic failure)^a

Rockall and Baylor Score
<ul style="list-style-type: none"> Consists of two components: <ul style="list-style-type: none"> Pre-endoscopy scores Post-endoscopy scores It consists of comorbidity, age, shock, diagnosis at time of endoscopy and endoscopic stigmata of recent hemorrhage. (CASDE)^a A Pre-endoscopy score based purely upon clinical factors of co-morbidity, age and shock gives a score of 0–7 with a step-wise increase in mortality. A Post-endoscopy score include the further endoscopic criteria of diagnosis and stigmata of recent hemorrhage and gives a total score of 0–11. The initial (pre-endoscopic) Rockall score is predictive of mortality^a in patients with peptic ulcer bleeding. Complete Rockall score is predictive of peptic ulcer rebleeding^a.

Rockall and Baylor Score				
Variables	0	1	2	3
Age	<60 years	60–79 years	> 80 years	
Shock	No shock	Tachycardia Systolic BP > 100 Pulse > 100	Hypotension Systolic BP < 100	
Co-Morbidities	No	No	Cardiac failure Ischemic heart disease	Renal failure Liver failure
Diagnosis	No lesion identified Mallory-Weiss tear	All other	Malignancy of upper GI tract	
Major stigma of recent Hemorrhage	None or dark spot only	Blood in upper GI tract	Adherent clot or visible spurting vessels	

93. Ans. c. Adherent clot (Ref: Sabiston 19/e p1165; Shackelford 7/e p711)

The Forrest Classification (For Endoscopic Findings and Rebleeding Risk)		
Grade	Description	Rebleeding Risk
Ia	Active, pulsatile bleeding ^a	High
Ib	Oozing ^a , non-pulsatile bleeding	High
IIa	Non-bleeding visible vessel ^a	High
IIb	Adherent clot ^a	Intermediate
IIc	Black dot ^a	Low
III	Clean base ^a	Low

• High rebleeding risk: I and IIa^a

• Intermediate risk: IIb^a

• Low risk: IIc and III^a

94. Ans. c. Can detect causes in all cases (Ref: Sabiston 19/e p1163; Schwartz 9/e p917; Bailey 26/e p1042, 25/e p1063–1064)

ROLE OF ENDOSCOPY IN UPPER GI BLEED

- Endoscopy: Foundation of diagnosis and management of patients with an upper GI bleed^a

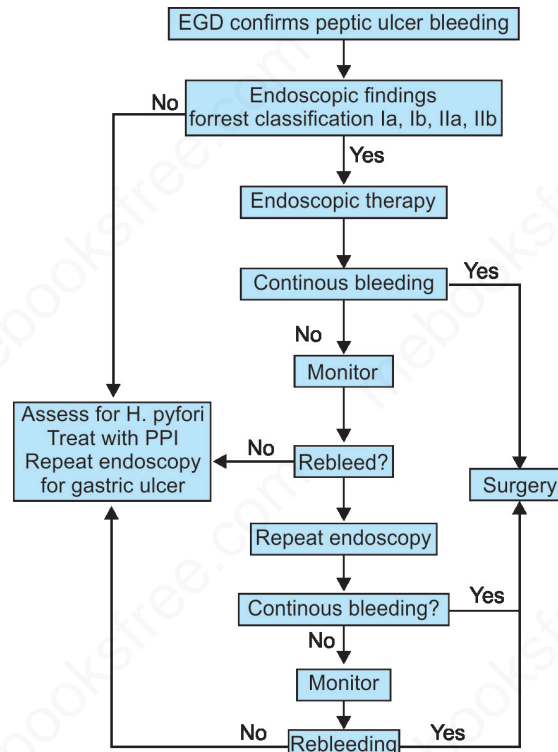
Early endoscopy (within 24 hours) results in

- Reductions in blood transfusion requirements^a
- Decrease in the need for surgery^a
- Shorter length of hospital stay^a

- In general, 20–35% of patients undergoing endoscopy will require a therapeutic endoscopic intervention, and 5–10% will eventually require surgery^a.

- **Best tool for localization of the bleeding source is endoscopy^Q**
 - In 1–2% of patients with upper GI hemorrhage, the source cannot be identified because of excessive blood impairing visualization of the mucosal surface.
- **Aggressive lavage of the stomach with room temperature normal saline solution before the procedure can be helpful^Q.**

95. Ans. a. Endoscopy



96. Ans. b. Angiography can image bleeding at a rate of 0.05-0.1 mL/min or less (Ref: Sabiston 19/e p1174)

Selective angiography, using either the superior or inferior mesenteric arteries, can detect hemorrhage in the range of 0.5 to 1.0 mL/min.

MESENTERIC ANGIOGRAPHY

- Selective angiography, using either the superior or inferior mesenteric arteries, can detect hemorrhage in the range of 0.5 to 1.0 mL/min^Q.
- Only employed in the diagnosis of ongoing hemorrhage^Q.

- Particularly useful in identifying the vascular patterns of angiodysplasias.
 - It may also be used for localizing actively bleeding diverticula^Q.

- Catheter-directed vasopressin infusion can provide temporary control of bleeding^Q, permitting hemodynamic stabilization, although as many as 50% of patients experience rebleeding when the medication is discontinued.
- It can also be employed for embolization^Q.
- Complications: Hematomas, arterial thrombosis, contrast reactions, and acute renal failure.

RADIONUCLIDE SCANNING

- Radionuclide scanning with technetium-99m (^{99m}Tc)-labeled RBCs is the most sensitive but least accurate method for localization of GI bleeding^Q.
- With this technique, the patient's own RBCs are labeled and reinjected.
- The labeled blood is extravasated into the GI tract lumen, creating a focus that can be detected scintigraphically^Q.
- Initially, images are collected frequently and then at 4 hour intervals for up to 24 hours.

- The tagged RBC scan can detect bleeding as slow as 0.1 mL/min and is reported to be more than 90% sensitive^Q.

- Unfortunately, the spatial resolution is lacking, and blood may move retrograde in the colon or distally in the small bowel.
- Reported accuracy of localization is 40-60%, and it is particularly inaccurate in distinguishing right- from left-sided colonic bleeding^Q.

97. Ans. d. CA stomach

98. Ans. c. Endoscopy can best diagnose it; d. Peptic ulcer is the MC cause; e. ↑ed BUN (Ref: Sabiston 19/e p1161-1167; Schwartz 9/e p917; Bailey 26/e p1042-1043, 25/e p1063-1064; Shackelford 7/e p710-713)

MANAGEMENT OF BLEEDING ULCERS

- **Actively bleeding ulcers** and ulcers with **non-bleeding visible vessels** (protrudent discoloration) warrant **endoscopic therapy**^Q.
- The management of ulcers with **adherent clots** consists of **aggressive irrigation** followed by **endoscopic therapy** (injection of epinephrine combined with **thermal treatment**)^Q.
- **Most frequent endoscopic characteristic** is clean base (**type III**).
- **NG aspirate** may be **negative** in the presence of **significant duodenal bleeding** and a **competent pylorus** preventing duodenogastric reflux. When **emergency surgery** for life threatening **lower GI hemorrhage** is being contemplated, **preoperative** or **intraoperative** EGD is appropriate, particularly relevant if blind subtotal colectomy for massive hemorrhage is being considered.

- **Early EGD** (within 24 hours) results in **reductions** in **blood transfusion** requirement, a **decrease** in the need for surgery, and a **shorter** length of **hospital stay**^Q.

- Around **20–35%** of patients undergoing EGD will **require a therapeutic endoscopic intervention**, and **5–10%** will eventually **require surgery**. In **1–2%** of patients with upper GI hemorrhage, the **source cannot be identified** because of excessive blood impairing visualization of the mucosal surface. **Lavage of the stomach** with **room temperature normal saline** solution can be helpful.
- When **surgery** for upper GI hemorrhage is **undertaken**, such operations are typically **confined to the eldest** and often the **sickest** patient.

Medical Management:

- **PPI** have been shown to **reduce the risk** for **rebleeding** and the need for **surgical intervention**. Only **60–70%** of patients with a bleeding ulcer test **positive for H.pylori**; after **H.pylori eradication** there is **no need** for **long-term acid suppression**^Q

Endoscopic management:

- **Epinephrine** injection (**1:10,000**) to all **four quadrants** in large volume (**> 13 mL**); electrocoagulation for bleeding ulcers and **argon plasma coagulation** for **superficial lesion**; a **second attempt** at endoscopic control **before surgical intervention** is encouraged.
- Ulcers **> 2 cm**, **posterior duodenal** ulcers and **gastric** ulcers have a significantly **higher risk** for rebleeding.

99. Ans. b. Duodenal ulcer (Ref: Sabiston 19/e p1164, 18/e p1524, 1529)

- **Peptic ulcer** is the **most common cause** of **upper GI bleeding**, present in **one-half to two-third** of patients with upper GI bleeding. **Bleeding may be the initial presenting symptom** in up to **10%** of patients with peptic ulcer. **Duodenal ulcer bleeding** is **more common** than **gastric ulcer bleeding**.
- Only **10–15%** of 'Heavy' drinkers develop **alcoholic cirrhosis** (leading to **esophageal varices**).

100. Ans. b. Duodenal ulcer

101. Ans. b. Intravenous beta-blockers (Ref: Sabiston 19/e p1165-1167; Bailey 26/e p1043-1044, 25/e p1063-1065; Shackelford 7/e p710-713)

- **Pharmacotherapy** in **variceal bleeding** consists of:
 - **Continuous IV infusion** of somatostatin analogue **octreotide**
 - Infusion of **vasopressin** or **vasopressin plus nitroglycerine**
- **Beta-blockers** are used in **secondary prevention** of recurrent variceal bleed.
- **Beta-blockers** have **no role** in the **management** of **acute upper GI bleeding**.

102. Ans. a. Sclerotherapy (Ref: Sabiston 19/e p1170-1173; Blumgart 5th/1129-1134; Shackelford 7/e p1597, 1599-1601; Harrison 18/e p2598)

VARICEAL BLEEDING

- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible**
- If varices are found they are treated with either **endoscopic variceal ligation** or **sclerotherapy**^Q.
- **EVL** is the **treatment of choice** for **variceal bleeding**^Q.

103. Ans. a. Hepatic encephalopathy (Ref: Sabiston 19/e p1434; Schwartz 10/e p1223, 9/e p1113; Blumgart 5th/1135-1138; Shackelford 7/e p1600-1601; Harrison 18/e p2598)

Complications of Injection Sclerotherapy

- | | |
|--|---|
| <ul style="list-style-type: none"> • Esophageal ulcerations^Q (May bleed or perforate) • Mediastinitis^Q | <ul style="list-style-type: none"> • Pleural effusion^Q • Pulmonary edema • Late strictures^Q |
|--|---|

104. Ans. c. Intravenous pantoprazole (Ref: Sabiston 19/e p1164-1167; Schwartz 9/e p917; Bailey 25/e p1063-1065)

105. Ans. b. Repeat upper GI endoscopy (Ref: Sabiston 19/e p1166, 18/e p1218)

- Sabiston says that "The cause of obscure-overt bleeding is often a common lesion that is missed on initial evaluation. Repeat upper and lower endoscopy is a valuable tool in identifying missed lesions because up to 35% patients have the bleeding source identified on second look endoscopy."

106. Ans. b. Radiolabelled erythrocyte scanning

- Radionuclide scanning with technetium-99m (^{99m}Tc)-labeled RBCs is the most sensitive but least accurate method for localization of GI bleeding^Q.

107. Ans. b. FII a

108. Ans. d. Duodenal ulcer

109. Ans. b. Peptic ulcer

110. Ans. a. Vascular ectasia

MALLORY-WEISS TEAR

111. Ans. a. Massive hemorrhage is MC manifestation (Ref: Sabiston 19/e p1167, 1222; Schwartz 10/e p1018-1020, 9/e p875, 941; Bailey 26/e p994, 25/e p1065; Shackelford 7/e p768)

Massive hemorrhage is rare in Mallory-Weiss syndrome.

MALLORY WEISS SYNDROME

- Mallory-Weiss tears are related to forceful vomiting, retching, coughing, or straining^Q
- Forceful contraction of the abdominal wall against an unrelaxed cardia, resulting in mucosal laceration of the proximal cardia^Q as a result of the increase in intragastric pressure.

- Results in disruption of gastric mucosa high on the lesser curve at cardia (just below GE junction)^Q

- Results in disruption of gastric mucosa high on the lesser curve at cardia (just below GE junction)
- Tear is partial thickness, extending through the mucosa and submucosa^Q

Clinical Features:

- Classically, seen in alcoholic patients^Q after a period of intense retching and vomiting after binge drinking.
- Cause of up to 15% of all severe upper GI bleeds^Q

- Arterial bleeding, usually painless and are rarely^Q associated with massive bleeding.

- The overall mortality rate is 3-4%, with the greatest risk for massive hemorrhage in alcoholic patients with preexisting portal hypertension^Q.

Diagnosis:

- Usually diagnosed by history
- Endoscopy is used to confirm the diagnosis^Q.
- Most tears occur along the lesser curvature^Q.

Treatment:

- Supportive therapy is often all that is necessary because 90% of bleeding episodes are self-limited, and the mucosa often heals within 72 hours^Q.

Persistent Bleeding in Mallory Weiss Syndrome is managed by

Endoscopic electrocoagulation^Q or endoscopic therapy with injection

Angiographic embolization^Q

Surgery consists of laparotomy and high gastrotomy with oversewing of the linear tear^Q, if above maneuvers fails.

- Recurrent bleeding from a Mallory-Weiss tear is uncommon^Q.

Remember: A Sengstaken-Blakemore tube will not stop bleeding in Mallory-Weiss syndrome, as the bleeding is arterial and the pressure in the balloon is not sufficient to overcome the arterial pressure and is contraindicated^Q.

112. Ans. d. Symptoms improves after conservative management), E (Longitudinal tear at junction of esophagus and stomach

113. Ans. a. Mallory-Weiss syndrome

114. Ans. d. Seen in alcoholics

115. Ans. a. Gastric cardia

116. Ans. a. Patient who abuse analgesics

117. Ans. c. Mallory-Weiss syndrome

118. Ans. b. Left gastric artery (Ref: Harrison 19th/e p277, 18th/e p2436; Sabiston 19th/1167, 1222; Schwartz 9th/875, 941; Bailey 26th/994, 25th/1065; Shackelford 7th/768)

- “Mallory-Weiss tears are characterized by arterial bleeding. Most Mallory-Weiss tears stop bleeding spontaneously and supportive treatment is all that is required. If bleeding continues, infusion of vasoactive substances into the celiac artery or into the left gastric artery often obviates the need for operation.”

DIEULAFOY'S LESION

119. Ans. a. Angiographic embolization is the preferred treatment (Ref: Sabiston 19/e p1168, 1222; Schwartz 10/e p1089, 9/e p940; Bailey 26/e p1043, 25/e p1065; Shackelford 7/e p769)

- Initial attempts at endoscopic control are often successful. Application of thermal or sclerosant therapy is effective in 80–100% of cases. In cases that fail endoscopic therapy, angiographic coil embolization can be successful.

DIEULAFOY'S GASTRIC LESION

- Caused by an abnormally large (1–3 mm)^Q, tortuous artery coursing through the submucosa
- Occurs 6–10 cm from the GE junction, generally in the 'fundus' near the cardia along the lesser curvature^Q.

- Erosion of the superficial mucosa overlying the artery occur secondary to the pulsations of the large submucosal vessel^Q arteriole

- Artery is exposed to the gastric contents, leading to further erosion and bleeding occurs^Q.
- Mucosal defect is 2–5 mm in size

Clinical Features:

- More common in men (2:1) with peak incidence in the 5th decade^Q.
- Associated with sudden onset of massive, painless, recurrent hematemesis with hypotension
- Recurrent bleeding with spontaneous cessation is common^Q.

Diagnosis:

- Endoscopy is the diagnostic modality of choice, correctly identifying the lesion in 80% of patients.

- Repeated endoscopies may be needed to correctly identify the lesion because of intermittent nature of the bleeding^Q

- Angiography showing a tortuous ectatic artery in the distribution of the left gastric artery with accompanied contrast extravasation in the setting of acute bleeding.

Treatment:

- Initial attempts at endoscopic control are often successful^Q.
- Application of thermal or sclerosant therapy is effective in 80–100% of cases.^Q
- In cases that fail endoscopic therapy, angiographic coil embolization can be successful^Q.
- Gastric wedge resection to include the offending vessel is reserved when other modalities have failed^Q.

120. Ans. d. Angiographic embolization is the preferred treatment

121. Ans. a. Within 6 cm of GE junction

122. Ans. d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

GASTRIC ANTRAL VASCULAR ECTASIA

123. Ans. c. Pain is most common clinical symptom (Ref: Sabiston 19/e p1168; Schwartz 10/e p1088, 9/e p940; Shackelford 7/e p653–654, 768–769)
Most common clinical symptom is bleeding, not the pain.

WATERMELON STOMACH (GASTRIC ANTRAL VASCULAR ECTASIA)

- A rare entity characterized by presence of both inflammatory and vascular components in mucosa^Q.

- On endoscopy: Prominent longitudinal folds with parallel striking red stripes atop the mucosal folds of the distal stomach, much like the rind of a watermelon^Q.

Pathology:

- Dilated mucosal blood vessels in the lamina propria, often containing thrombi, with no evidence of vascular malformation on angiographic and morphologic examination^Q.
- Mucosal fibromuscular hyperplasia and hyalinization are often present^Q.
- Predominantly affects the distal portion (Antrum)^Q of the stomach

Clinical Features:

- Patients are generally elderly women with chronic bleeding^Q.
- Most have an associated autoimmune connective tissue disorders, and at least 25% have chronic liver disease^Q.
- Patients typically have iron deficiency anemia and chronic blood loss requiring transfusions^Q.

Diagnosis:

- The diagnosis is based on **typical endoscopic** and **biopsy appearance** of the mucosa^Q.
 - Gross endoscopic examination reveals **prominent longitudinal folds** with **parallel striking red stripes** atop the mucosal folds of the **distal stomach**, much like the rind of a watermelon^Q.

Treatment:

- The lesions are treated by **endoscopic cautery**^Q.
- In patients with **portal hypertension**, **TIPS** should be considered first^Q.

124. Ans. a. Capillary lesion; d. Best treatment argon plasma coagulation; e. Associated with chronic renal failure and iron deficiency anemia

125. Ans. b. Gastric antral vascular ectasia

MÉNÉTRIER'S DISEASE

126. Ans. d. Hyperchlorhydria (Ref: Sabiston 19/e p1222; Schwartz 10/e p1088, 9/e p940; Bailey 26/e p1032, 25/e p1054)

MÉNÉTRIER'S DISEASE (HYPOPROTEINEMIC HYPERTROPHIC GASTROPATHY)

- A rare, **acquired**^Q, **premalignant**^Q disease, of unknown cause
- Characterized by **massive gastric folds** in the **fundus**^Q and **corpus** of the stomach, giving the mucosa a **cobblestone** or **cerebriform appearance**^Q.

- Associated with **CMV infection** in **children**^Q and **H. pylori** infection in **adults**^Q.

Pathology:

- Foveolar hyperplasia** (expansion of surface mucous cells) with **absent parietal cells**^Q.
- Increased TGF-alpha** has been noted in the **gastric mucosa**^Q

- Associated with **protein loss** from the stomach, **excessive mucus production**, and **hypochlorhydria** or **achlorhydria**^Q.

Clinical Features:

- Epigastric pain, vomiting, **weight loss**, **anorexia**, and peripheral **edema**^Q.

Diagnosis:

- Typical gastric mucosal changes** can be detected by **radiographic** or **endoscopic** examination.
- Biopsy** should be performed to **rule out gastric carcinoma** or **lymphoma**^Q.
- Twenty-four-hour pH monitoring** reveals **hypochlorhydria** or **achlorhydria**^Q
- Chromium-labeled albumin test** reveals **increased GI protein loss**^Q.

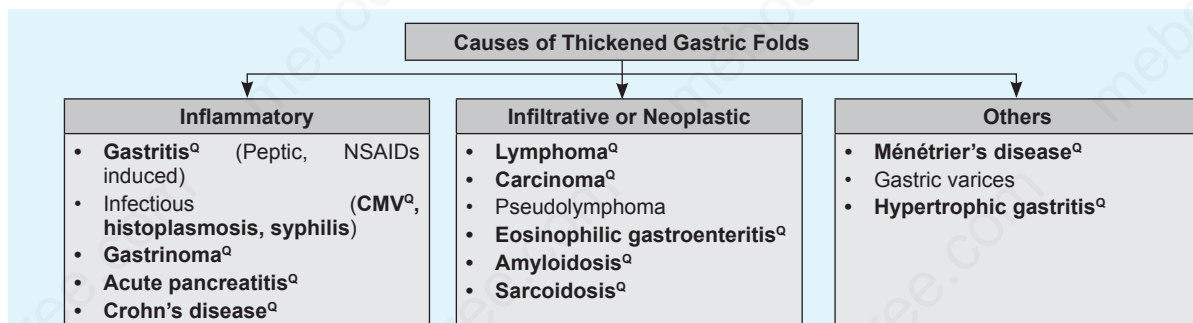
Treatment:

- Medical treatment is limited to **albumin replacement** and maintenance of **adequate nutrition**, acid suppression, octreotide and H. pylori eradication^Q.
- Total gastrectomy** for **bleeding**, **severe hypoproteinemia** or **cancer**^Q.

127. Ans. b. Hyperchlorhydria

128. Ans. b. Decreased mucus production

129. Ans. a. Lymphoma; b. Ménétrier's disease; c. Carcinoma; d. Eosinophilic gastritis (Ref: Chapman 4th/234; Harrison 18/e p2459)



130. Ans. a. Seen in Ménétrier's disease and ZES, c. It shows cerebriform rugosity in stomach, d. More in fundus and body

131. Ans. a Giant folds in the pyloric antrum

GASTRIC POLYPS

132. Ans. a. Adenoma (Ref: Sabiston 19/e p1206; Schwartz 10/e p1076-1077, 9/e p938; Bailey 26/e p1045, 25/e p1066; Shackelford 7/e p769)

GASTRIC POLYPS

- There are five types of gastric epithelial polyps inflammatory, hamartomatous, heterotopic, hyperplastic and adenoma. The first three types have negligible malignant potential.

- The **most common** gastric polyp is the **hyperplastic^Q** or **regenerative polyp**, which frequently occurs in the setting of gastritis.
- Polyps that are **symptomatic**, **> 2 cm** or **adenomatous** should be **removed**.

- Among patients with **FAP**, **gastric polyps (33–60%)** are **more common** as compared to **gastric adenomas (15%)**.

Hyperplastic or Regenerative Polyp:

- MC gastric polyp^Q
- Contains an overgrowth of **histologically normal** appearing gastric epithelium.
- Size of the polyp **does not appear** to be an **important factor^Q**.

- Usually **single**; **incidence is high** in the **gastric remnant** after partial gastrectomy, mostly **asymptomatic** and **stationary^Q**.

Hamartomatous Polyps:

- Encountered **most commonly** in association with hereditary gastrointestinal **polyposis syndromes**; including generalized juvenile polyposis (15%); Peutz-Jeghers syndrome (25–50%); FAP and related **Gardner's syndrome**.

Inflammatory Polyp:

- A polyp made of inflammatory tissue can be called an **inflammatory pseudopolyp** because glandular tissue is either lost or absent.
- Inflammatory fibroid polyp**: occurs **most commonly** in the **stomach**, mainly in the **distal region** and **pylorus**
- An inflammatory polyp with prominent cystic glands is called a **retention polyp** because of dilated glands that are filled with retained mucus.
- Polyps associated with **Cronkhite-canada syndrome** is of **retention type**.

Fundic gland Polyp

- Present as **multiple 2–3 mm sessile lesions** in the **body** and **fundus**, most commonly in **healthy gastric mucosa**
- Have **no malignant potential**
- Most cases are sporadic but can occur in **53%** of patients with **FAP** or **Gardner's syndrome**.

Adenomatous Polyp

- Most commonly **antral**, **sessile**, **solitary** and **eroded**.
- Malignant transformation** in **10–20%**.
- Presence is a **marker** indicating an **increased risk for development of cancer** in **remainder gastric mucosa**.
- Types: Flat (tubular)** and **papillary** (villous and tubulovillous)

Flat (tubular)	Papillary (villous and tubulovillous)
<ul style="list-style-type: none"> Most common^Q form of adenomas, especially in Japan. Two layer architecture and relative indolence of immature epithelial cells^Q are hallmarks of flat adenoma distinguishing from papillary adenoma. 	<ul style="list-style-type: none"> Papillary adenomas are sessile or broad-based nodular lesions with a lobulated contour and deep crevices^Q. Papillary adenoma has velvety appearance on endoscopy and soap bubble^Q or paint brush appearance on barium meal^Q.

- Gastric **flat adenomas** have a **lower incidence** of malignant changes, the **incidence increases** with the **grade** of dysplasia, the **papillary pattern** and size of the lesion.

133. Ans. a. Hyperplastic polyp

CARCINOMA STOMACH PREDISPOSING FACTORS

134. Ans. a. Benign ulcer (Ref: Sabiston 19/e p1204-1206; Schwartz 10/e p1074-1086, 9/e p928; Bailey 26/e p1046, 25/e p1067; Shackelford 7/e p774)

Factors Associated with Increased Risk of Developing Stomach Cancer	
Nutritional	Medical
<ul style="list-style-type: none"> • Low fat or protein consumption^Q • Salted meat^Q • High nitrate consumption^Q • High complex-carbohydrate consumption^Q 	<ul style="list-style-type: none"> • Prior gastric surgery^Q • H. pylori^Q infection • Epstein-Barr virus^Q • Gastric atrophy and gastritis^Q • Adenomatous polyps^Q • Male gender^Q
Social	Occupational
<ul style="list-style-type: none"> • Low social class^Q 	<ul style="list-style-type: none"> • Rubber workers^Q • Coal workers^Q
Environmental	Genetic factors
<ul style="list-style-type: none"> • Poor food preparation (smoked, salted)^Q • Lack of refrigeration^Q • Poor drinking water (well water)^Q • Smoking^Q 	<ul style="list-style-type: none"> • Blood group 'A'^Q • Pernicious anemia^Q • Family history • Hereditary nonpolyposis colon cancer^Q • Li-Fraumeni syndrome^Q

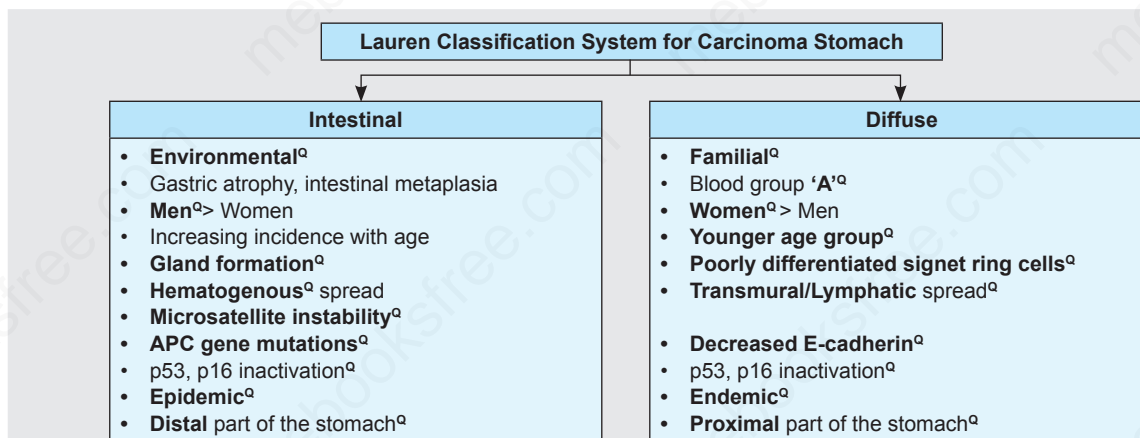
- Decrease risk of carcinoma stomach: Aspirin, Diet (high fresh fruit and vegetable intake), Vitamin A and C, calcium, selenium, zinc and iron^Q.
- Alcohol is not a risk factor for CA stomach^Q.

COX-2 Inhibitors are protective in	
<ul style="list-style-type: none"> • Barrett's esophagus^Q • SCC and adenocarcinoma of esophagus^Q 	<ul style="list-style-type: none"> • Carcinoma stomach^Q • Desmoid tumors^Q • Small duodenal and rectal polyps in FAP^Q

135. Ans. d. Hyperplastic polyps

136. Ans. a. A

137. Ans. a. Diffuse type of gastric cancer (Ref: Sabiston 19/e p1207; Schwartz 9/e p931; Shackelford 7/e p773; Bailey 25/e p1068)



138. Ans. a. Intestinal metaplasia; b. Polyp-hyperplastic or adenoma; c. Atrophic gastritis

139. Ans. a. Pernicious anemia

140. Ans. d. Intestinal metaplasia type III

141. Ans. b. Hyperplastic polyp

142. Ans. c. Old peptic ulcer

143. Ans. b. Chronic gastric atrophy

144. Ans. b. Pernicious anemia and achlorhydria; d. Atrophic gastritis

145. Ans. a. Atrophic gastritis; c. Adenomatous polyp; d. Achlorhydria

146. Ans. c. Intestinal metaplasia

147. Ans. b. 'O' blood group

148. Ans. c. Atrophic gastritis

149. Ans. None

150. Ans. b. Most common at fundus

151. Ans. b. Intestinal metaplasia (Ref: Shackelford 7/e p773-774; Schwartz 10/e p1074-1086, 9/e p928-929)

Precursor lesions of Carcinoma Stomach	
<ul style="list-style-type: none"> Adenomatous gastric polyps Chronic atrophic gastritis Dysplasia 	<ul style="list-style-type: none"> Intestinal metaplasia Ménétrier's disease

INTESTINAL METAPLASIA

- Types: complete type I and incomplete types II and III^Q
- The risk for progression to gastric cancer is higher in type III^Q metaplasia than in type I.
- The types differ based on the patterns of mucin core protein (MUC) expression as well as cell type composition.
 - Type I: Presence of absorptive cells, paneth cells and goblet cells secreting sialomucins
 - Incomplete types: Presence of columnar and goblet cells secreting sialomucins, sulfomucins or both.

CA STOMACH CLINICAL FEATURES AND TREATMENT

152. Ans. a. Occurs at distal end (Sabiston 19/e p1204-1218; Schwartz 10/e p1074-1086, 9/e p926-935; Bailey 26/e p1045-1053, 25/e p1067-1074; Shackelford 7/e p774-778)

CARCINOMA STOMACH

- Incidence of gastric cancer, especially distal cancer is decreasing^Q
- Incidence of GE junction tumors are increasing^Q
- Approximately 90% of all tumors of the stomach are malignant, the vast majority of which are gastric adenocarcinoma^Q.
 - MC genetic abnormalities: p53 and COX-2 gene^Q (SPC: Stomach, p53 and COX-2 gene)

- Tumor Markers: CEA, CA 19-9, CA-125, CA 72-4 and beta-HCG

Clinical Features

- Abdominal pain (62-91%)^Q and weight loss (22-61%) are the MC symptoms.
- Typically, however, the pain is constant, nonradiating, and unrelieved by food ingestion.
- Proximal tumors involving the gastroesophageal junction often present with dysphagia, whereas distal antral tumors may present as gastric outlet obstruction^Q.
 - Diffuse mural involvement by tumor, as occurs in linitis plastica, leads to decreased distensibility of the stomach and complaints of early satiety^Q.
- Ascitis, jaundice or palpable mass indicate incurable disease^Q.
- The transverse colon is a potential site for malignant fistulization and obstruction from gastric primary tumor.
 - Patients may present with a palpable abdominal mass, a palpable supraclavicular (Virchow's) or periumbilical (Sister Mary Joseph's) lymph node, left axilla (Irish nodes) peritoneal metastasis palpable by rectal examination (Blummer's shelf), or a palpable ovarian mass (Krukenberg's tumor)^Q.
- Paraneoplastic syndromes include thrombophlebitis (Trousseau's syndrome), neuropathies, nephrotic syndrome, and DIC.

Lymph Node Metastasis

- Relative risk of nodal metastases at a specific nodal location depends on both the site of origin of the primary tumor and width and depth^Q of invasion of gastric wall.
- Proximal stomach and GE junction tumors: Higher propensity of spread to nodes in the mediastinum and pericardial region^Q.
- Tumors in the body of stomach: Highest likelihood of spreading to nodes along the greater and lesser curvature, near the location of the primary tumor mass^Q.
- Tumors in the distal stomach: High likelihood of spread to the periduodenal, peripancreatic, and porta hepatis nodes^Q.

Diagnosis

- Endoscopy with biopsy is the best method^Q to diagnose gastric cancer

Treatment of Carcinoma Stomach according to site	
Proximal-third	Extended gastrectomy, including the distal esophagus ^Q
Middle-third	Total gastrectomy and D2 LN dissection ^Q .
Distal-third	Intestinal-type: Subtotal gastrectomy with D2 LN dissection ^Q Diffuse-type: Total gastrectomy with D2 LN dissection ^Q

Recurrence:

- Overall 5-year survival rates after the diagnosis of gastric cancer are 10–21%.
- Patients who undergo a potentially curative resection have a 5-year survival rate of 24–57%.
- Recurrence rates after gastrectomy remain high, ranging from 40–80%^Q.
- Most recurrences occur within the first 3 years^Q.

- Loco-regional failure rate is highest at the anastomosis or stump (25%)^Q > stomach bed (21%) > regional nodes.

- MC site of metastasis: Liver^Q > lung > bone.

Surveillance

- Follow-up should include a complete history and physical examination every 4 months for 1 year, then every 6 months for 2 years, and then annually thereafter.
- Laboratory examinations, including complete blood counts and liver function tests, should be obtained as clinically indicated.
- Yearly endoscopy should be considered in patients who have undergone a subtotal gastrectomy

Prognosis:

- Prognostic factors for CA stomach: Depth^Q of invasion and LN status^Q

7 th AJCC: TNM Classification of Carcinoma of the Stomach	
Tis: Carcinoma in situ: intraepithelial tumor without invasion of the lamina propria	N1: Metastasis in 1–2 regional LNs
T1a: Tumor invades lamina propria, muscularis mucosa	N2: Metastasis in 3–6 regional LNs
T1b: Tumor invades submucosa	N3a: Metastasis in 7–15 regional LNs
T2: Tumor invades muscularis propria	N3b: Metastasis in 16 or more regional LNs
T3: Tumor penetrates subserosal connective tissue without invasion of visceral peritoneum or adjacent structures	
T4a: Tumor invades serosa (visceral peritoneum)	M1: Distant metastasis
T4b: Tumor invades adjacent structures	

Stage Grouping								
Stage	IA	IB	IIA	IIB	IIIA	IIIB	IIIC	IV
	T1N0	T1N1 T2N0	T1N2 T2N1 T3N0	T1N3 T2N2 T3N1 T4aN0	T2N3 T3N2 T4aN1	T3N3 T4aN2 T4bN0 T4bN1	T4aN3 T4bN2 T4bN3	Any T, Any N, M1

153. Ans. d. Type IV (Ref: Sabiston 19/e p1207; Schwartz 9/e p931; Bailey 26/e p1049, 25/e p1059; Shackelford 7/e p773)

Bormann Classification (Based on macroscopic appearance)	
Type I	Polypoid or fungating ^Q cancers
Type II	Fungating and ulcerated with surrounded by elevated borders ^Q
Type III	Ulcerated lesions infiltrating the gastric wall ^Q
Type IV	Infiltrates diffusely (Linitis plastica) ^Q
Type V	Unable to be classified

154. Ans. a. Decreased E-cadherin

155. Ans. a. More common

156. Ans. a. Decreased E-cadherin

157. Ans. c. Hematogenous spread

158. Ans. b. II

- T4a: Tumor invades serosa (visceral peritoneum)

- Stage IIB: T1N3, T2N2, T3N1, T4aN0

159. Ans. c. p53

160. Ans. a. Suprapyloric (Ref: Sabiston 19/e p1210; Bailey 26/e p1049–1050, 25/e p1073)

LYMPH NODE STATIONS

1. Right cardiac; 2. Left cardiac; 3. Lesser curvature; 4. Greater curvature; 5. Suprapyloric; 6. Infrapyloric; 7. Left gastric; 8. Common hepatic; 9. Celiac; 10. Splenic hilus; 11. Splenic artery; 12. Hepatoduodenal ligament; 13. Retropancreatic; 14. Mesenteric root; 15. Transverse mesocolon; 16. Paraaortic

161. Ans. a. Celiac

162. Ans. c. Rectum (Ref: Sabiston 19/e p1207; Schwartz 9/e p932; Bailey 26/e p1050, 25/e p1070)

Sister Mary Joseph nodule	
Gastrointestinal malignancies	Gynecological malignancies
<ul style="list-style-type: none"> • Gastric cancer (MC)^Q • Colonic cancer^Q • Pancreatic cancer (mostly body and tail)^Q 	<ul style="list-style-type: none"> • Ovarian cancer^Q • Uterine cancer^Q

SISTER MARY JOSEPH NODULE

- Sister Mary Joseph nodule or node, also called Sister Mary Joseph sign, refers to a palpable nodule bulging into the umbilicus as a result of metastasis of a malignant cancer in the pelvis or abdomen^Q.

- Gastrointestinal malignancies account for half of underlying sources (most commonly gastric cancer, colonic cancer or pancreatic cancer, mostly of the tail and body of the pancreas), and men are more likely to have an underlying cancer of the gastrointestinal tract^Q.

- Gynecological cancers account for about 1 in 4 cases (primarily ovarian cancer and also uterine cancer)^Q.

Proposed mechanisms for the spread of cancer cells to the umbilicus

- | | |
|---|--|
| <ul style="list-style-type: none"> • Direct transperitoneal spread^Q • Via lymphatics^Q which run alongside the obliterated umbilical vein • Hematogenous spread^Q | <ul style="list-style-type: none"> • Via remnant structures: <ul style="list-style-type: none"> - Falciiform ligament^Q - Median umbilical ligament^Q - Remnant of the vitelline duct^Q |
|---|--|

Prognosis:

- Sister Mary Joseph nodule is associated with multiple peritoneal metastases and poor prognosis^Q.

163. Ans. b. Often associated with hypochlorhydria/achlorhydria

164. Ans. b. Gastric antrum

165. Ans. None

- T4a: Tumor invades serosa (visceral peritoneum)
- Stage IIIC: T4aN3, T4bN2, T4bN3
- N3a: Metastasis in 7-15 regional LNs

166. Ans. a. Enterogastric reflex is the cause (Ref: Bailey 26/e p1053, 25/e p1061)

GASTRIC STUMP CARCINOMA

- It is defined as carcinoma arising in the gastric remnant > 5 years^Q following previous gastric resection for benign diseases or > 15 years^Q after curative surgery for malignant disease.

Etiology

- Thought to be related to changes in the gastric mucosa which arise as a result of the change in the anatomical relationship between the stomach and the small intestine following surgery.

- Enterogastric reflux^Q plays a very significant role in the pathogenesis.

- Other important etiological factors include: Bacterial proliferation and hypochlorhydria^Q which increases the mucosal susceptibility to carcinogenesis by N-nitrosamines.

Pathology

- Most of the stump carcinomas are often near the stoma but many of these tumors are quite large at presentation.
- Equally divided between intestinal and diffuse subtypes^Q.
- Histologically they are classified as Adenocarcinoma^Q, Adeno-squamous, Squamous cell carcinoma, Small cell and undifferentiated carcinoma.

Clinical Features

- Usually present late and the disease is advanced.

Treatment

- Surgical resection remains the only effective modality of treatment.
- Overall average survival is 4–6 months^Q.
- Surgery whether palliative, has survival benefit.

167. Ans. b. D2 gastrectomy include total gastrectomy; c. Surgical non curative lesion should not be resected; e. Hematemesis present in majority of patients (Ref: Bailey 26/e p1050-1052, 25/e p1067, 1071, 1074)

CARCINOMA STOMACH

- *H. pylori* infection increases risk of gastric cancer by causing chronic gastritis, loss of gastric acidity and bacterial growth in stomach.
- Gastrectomy can be total or subtotal in D2 gastrectomy.
- Patient with incurable disease are not subjected to radical surgery. Treatment is palliative systemic chemotherapy.
- After gastrectomy, there is loss of parietal cell mass leads to vitamin B₁₂ deficiency and replacement should be given routinely.
- MC symptom of carcinoma stomach is abdominal pain > weight loss.
- Hematemesis is very rare in carcinoma stomach.

168. Ans. a. Metastatic left supraclavicular lymphadenopathy 169. Ans. d. All of the above
 170. Ans. a. Castomach
 171. Ans. b. Incidence is now decreasing in Japan and China 172. Ans. d. Fundus
 173. Ans. a. Superficial spreading type

Most Common site of Gastric Malignancies	
CA stomach	Antrum ^Q
CA stomach in pernicious anemia	Fundus ^Q
Diifuse variety	Fundus ^Q
Gastric lymphoma	Antrum ^Q
Burkitt's lymphoma (by EBV)	Cardia or body ^Q

174. Ans. c. Involvement of mucosa, submucosa and muscularis (Ref: Sabiston 19/e p1213; Schwartz 9/e p931; Bailey 26/e p1047, 25/e p1068; Shackelford 7/e p774-775)

EARLY GASTRIC CANCER

- Adenocarcinoma limited to the mucosa and submucosa of the stomach, regardless of LN status^Q.
- Approx. 10% of patients will have LN metastasis^Q.
- Cancer of the lesser curve is more common than cancer of the greater curvature.

Japanese classification system for early gastric cancer	
Type I	Exophytic lesion extending into the gastric lumen
Type IIA	Elevated lesion with a height no more than the thickness of the adjacent mucosa
Type IIB	Flat lesions ^Q
Type IIC	Depressed lesions with an eroded but not deeply ulcerated appearance
Type III	Excavated lesions that may extend into the muscularis propria without invasion of this layer by actual cancer cells.

Treatment:

- Treatment options: Endoscopic mucosal resection^Q, limited surgical resection or gastrectomy
- Overall curative rate with adequate gastric resection and lymphadenectomy is 95%^Q
- Best prognosis^Q

175. Ans. b. Staining with endoscopic biopsy (Ref: Sabiston 19/e p1209-1212; Schwartz 9/e p932; Bailey 26/e p1027-1030, 25/e p1069-1070; Shackelford 7/e p774-775)

DIAGNOSIS OF CARCINOMA STOMACH

- Endoscopy is the best method to diagnose gastric cancer as it visualizes the gastric mucosa and allows biopsy for a histological diagnosis.
 - Chromoendoscopy helps identification of mucosal abnormalities through topical stains^Q.
 - Magnification endoscopy is used to magnify standard endoscopic field by 1.5-150 times^Q.
 - Narrow band imaging affords increased visualization of the microvasculature^Q.
- Confocal laser endomicroscopy permits in vivo, three-dimensional microscopy^Q including subsurface structures.
- EUS is a tool for pre-operative staging and selection for neoadjuvant therapy^Q.

176. Ans. a. Incidence increasing worldwide 177. Ans. e. Radioresistant

178. Ans. c. Partial gastrectomy + distal pancreatectomy (Ref: Sabiston 19/e p1212-1218; Schwartz 9/e p933-935; Bailey 26/e p1050-1053, 25/e p1071-1074; Shackelford 7/e p775-778)

TREATMENT OF CARCINOMA STOMACH

- Maintain a 5-cm margin proximally and distally to the primary lesion.
- Because of the extensive lymphatic network of the stomach and the propensity for microscopic extension, the traditional surgical approach attempts to maintain a 5-cm margin proximally and distally to the primary lesion.
- When the general oncologic goal of an R0 resection can be achieved by gastric preserving approach in mid and distal gastric cancer, partial gastrectomy is preferred over total gastrectomy.

Treatment of Carcinoma Stomach according to site	
Proximal-third	• Extended gastrectomy, including the distal esophagus ^Q
Middle-third	• Total gastrectomy and D2 LN dissection ^Q
Distal-third	• Intestinal-type: Subtotal gastrectomy with D2 LN dissection ^Q • Diffuse-type: Total gastrectomy with D2 LN dissection ^Q

- In subtotal gastrectomy the luminal extent of the resection comprises about 80% of the stomach. At the lesser curvature the resection should reach up to about 2 cm below the anatomic cardia. At the greater curvature the resection has to go beyond the right and left gastroepiploic arteries; the small remaining fundus is fed through the short gastric vessels from the splenic hilus.

Indications for Adjuvant Chemoradiation in Carcinoma Stomach

- T3, T4 or node positive cancers^Q
- Microscopically positive surgical margins^Q
- Spleen preserving D2 resection is the recommended surgical approach for patients with potentially curable gastric cancer.
 - Splenectomy should be performed only in cases with intraoperative evidence of direct tumor extension into the spleen or when the primary tumor is located in the proximal stomach along the greater curvature or posterior wall of stomach^Q.
 - Partial pancreatectomy should be performed only in cases of direct tumor extension to the pancreas^Q.

179. Ans. b. Subtotal gastrectomy
 180. Ans. b. Invasion of mucosa and submucosa irrespective to L.N. spread; c. Endoscopic removal of lesions; d. Conservative gastrectomy
 181. Ans. a. Involvement of omental nodes; e. Krukenberg tumor (Ref: Schwartz 9/e p1068-1074; CSDT 11/e p1175)

CARCINOMA STOMACH

- Bailey: "Involvement of other organ per se does not imply incurability, provided that it can be removed."
- Schwartz: "It should be strongly emphasized that many patients with positive lymph nodes are cured by adequate surgery. It should also be stressed that often lymph nodes that appear to be grossly involved with tumor turn out to be benign or reactive on pathologic examination. More than 15 resected lymph nodes are required for adequate staging. Therapeutic nihilism should be avoided and, in the low-risk patient, an aggressive attempt to resect all tumor should be made. The primary tumor may be resected en bloc with adjacent involved organs (e.g., distal pancreas, transverse colon, or spleen) during the course of curative gastrectomy."
- CSDT: "A solitary metastatic nodule in liver is also no indication against curable resection."
- Periumbilical node, Blumer's shelf, and Krukenberg's tumor represent incurable gastric cancer.

182. Ans. a. Carcinoma stomach (Ref: Robbins 8/e p786-787)

LEATHER BOTTLE STOMACH (LINNITIS PLASTICA)

- Pyloric antrum is MC site affected in localized variety^Q
- Stomach is massively thickened (feels like leather)^Q
- Pathology:**
 - Caused by proliferation of fibrous tissue mainly in submucosa^Q
 - Characterized by Mother of pearl appearance
 - Mucosa appears normal
- Clinical Features:**
 - Early satiety due to reduced stomach capacity^Q
 - LN metastasis is common^Q
- Treatment:**
 - Treated by radical gastrectomy^Q
- Prognosis:**
 - Associated with poor prognosis^Q

183. Ans. c. Dysphagia

184. Ans. d. Weight loss

Most Common Symptom	
CA Esophagus	• Dysphagia >weight loss ^Q
CA stomach	• Abdominal pain >weight loss ^Q
Periampullary carcinoma (including CA head of pancreas)	• Jaundice ^Q
HCC	• Abdominal pain >weight loss ^Q
Cholangiocarcinoma	• Painless progressive jaundice ^Q
CA Gallbladder	• Biliary colic ^Q
CA small bowel	• Abdominal pain ^Q
CA colon	• Abdominal pain ^Q
CA rectum	• Bleeding PR ^Q
CA anal canal	• Bleeding PR ^Q

185. Ans. d. None of the above

Subtotal gastrectomy should be done for resectable carcinoma stomach involving antrum.

186. Ans. c. Celiac

187. Ans. b. Stomach cancer

188. Ans. b. Laparoscopy

189. Ans. d. EUS (Ref: Schwartz 9/e p932)

- The best way to stage the tumor locally is via EUS, which gives fairly accurate (80%) information about the depth of tumor penetration into the gastric wall, and can usually show enlarged (> 5 mm) perigastric and celiac lymph nodes.

190. Ans. c. Stomach

GASTROINTESTINAL STROMAL TUMOR (GIST)

191. Ans. a Mesenchymal (Ref: Sabiston 19/e p1220-1221; Schwartz 10/e p1481-1485, 9/e p937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1028-1034)

GASTROINTESTINAL STROMAL TUMOR

- GISTs: MC mesenchymal tumor of the GI tract^Q
- MC primary site for GIST: Stomach (60–70%) > small bowel (20–25%) > colorectum and esophagus (5% each)^Q.
 - Most GISTs are positive for CD-117 (95%), BCL-2 (80%), CD-34 (70%)^Q.

- Types: Spindle cell (70%) and Epithelioid (30%)^Q

Pathology:

- Arise from the muscularis propria and most likely originate from the cells of Cajal^Q
- Expression of the receptor tyrosine kinase KIT (CD 117), 5% express platelet derived growth factor receptor alpha (PDGFRA)^Q.
- PDGFRA mutations in GIST appear to confer a very favorable prognosis with low risk of recurrence^Q.
- Spindle cell pattern (70%) of GIST is more common than epithelioid or round cell pattern (30%)^Q.
- New tumor markers of GIST: DOG-1 (discovered on GIST-1) and protein kinase C-theta

Clinical features:

- Patients usually present after the fourth decade, with the mean age of 60 years at diagnosis.
- MC presentations of gastric GISTs: GI bleeding and pain or dyspepsia.

Carney triad

- Association of extra-adrenal paragangliomas, pulmonary chondromas and multifocal GIST^Q.

Diagnosis:

- CT: IOC for evaluation of primary tumor and accurate staging^Q
- PET-CT: Gold standard for recurrent GIST^Q

- Percutaneous or endoscopic biopsy should only be performed if the results would obviate the need for surgery^Q.

Treatment:

- Bleeding manifestation is the MC indication for surgery^Q.
- GIST should be treated with segmental resection^Q (margins of 1cm)

- LN metastasis are uncommon, regional lymphadenectomy is not recommended^Q
- Intraoperative incisional biopsy prior to resection should be avoided, because it risks tumor spillage^Q

- **Imatinib^Q** (selective inhibitor of **type 3** tyrosine kinase KIT), is approved for use in **CD117-positive unresectable and metastatic GISTs**.

- Functional imaging of GIST with **18FDG-PET** scanning represents a useful diagnostic modality for **early-response assessment with imatinib therapy^Q**.
- **Sunitinib^Q** is used in **imatinib-refractory disease**.

Prognosis:

- **Tumor size** is a **predominant factor for survival** in surgical series for primary GIST.
- **MC sites of disease failure** after complete resection: **Liver^Q, omentum or peritoneal cavity**.

- **Half to two third primaries** will have disease **failure within the liver^Q** and nearly 40% will have liver as the only site of failure. Generally **hepatic involvement** is **multifocal**.

- **Median time to recurrence** after resection of primary GIST is **2 years^Q**.

192. Ans. c. Commonly metastasize to lymph nodes

193. Ans. a. GIST

194. Ans. b. GIST

195. Ans. b. CD-117

196. Ans. d. PET-CT

197. Ans. a. Most common in duodenum

198. Ans. a. Gastric carcinoma; b. Paraganglioma; c. Pulmonary Chordoma

199. Ans. d. Interstitial cells of Cajal

200. Ans. c. Leiomyosarcoma (Ref: www.ncbi.nlm.nih.gov/pubmed/3771120)

Leiomyosarcomas that occur **in the digestive tract** can also cause **gastrointestinal blockage or bleeding**, which can manifest as blood in the stool.

- Gastrointestinal stromal tumours (GISTs) are the **MC mesenchymal tumours** of the GIT.
- Formerly GISTs were commonly classified histologically as leiomyosarcomas; however, they are now known to **arise from the interstitial cells of Cajal**.
- **Majority of GISTs overexpress KIT** and have characteristic mutations within the gene, which are the targets of **drug treatment with tyrosine kinase inhibitors**.

- **Leiomyosarcoma** is a **malignant tumour of smooth muscle differentiation** and falls into a **group of sarcomas** that show **complex karyotypic changes** with no consistent recurrent genetic abnormality.

- **Upper GI bleeding** is the **MC clinical manifestation** of GISTs^Q, manifesting as hematemesis or melena in **40-65%** of patients. Bleeding occurs because of an ulcer forming in the gastric mucosa overlying the tumor.
- **Bleeding** is **more commonly seen in GIST** as compared to **Leiomyosarcoma^Q**.

ABDOMINAL LEIOMYOSARCOMA

- Leiomyosarcoma describes a **type of soft-tissue cancer** that **occurs within smooth muscle cells**.
- This kind of cancer can be **difficult to detect** as it often causes **no organ dysfunction until** the tumor has gotten to be **large in size^Q**.
- **Most common locations**: Uterus and stomach^Q.

Clinical Features:

- **Asymptomatic in initial stage^Q**
- **Earliest symptom**: Noticeable **lump or swelling** within the abdomen.
- Vague complaints, such as malaise, fatigue, and nonfocal abdominal pain, are often described.
- The **sign most often cited** is **bleeding^Q**. These tumors sometimes **necrose** and **bleed into the bowel**.
- **Leiomyosarcomas** that occur **in the digestive tract** can also cause **gastrointestinal blockage or bleeding^Q**, which can manifest as blood in the stool.
- **Uterine leiomyosarcomas** can cause **vaginal bleeding^Q**

Diagnosis:

- **Endoscopy** can be used to **visualize the tumors^Q**.
- A **definitive diagnosis** requires a **biopsy^Q**

Treatment:

- **First-line treatment**: **Surgical removal** of the cancerous tissue.
- **Uterine leiomyosarcoma**: **Total hysterectomy^Q**
- **Gastric leiomyosarcoma**: **Total gastrectomy^Q**

201. Ans. d. GIST

- Upper GI bleeding is the **most common clinical manifestation** of GISTs, manifesting as hematemesis or melena in **40-65%** of patients.
- Bleeding occurs because of an **ulcer forming in the gastric mucosa overlying the tumor**.

202. Ans. d. ALK gene mutation is seen in most of the cases (Ref: Robbins 9/e p775-777, 8/e p789-790; Sabiston 19/e p1220-1221; Schwartz 9/e p937; Bailey 26/e 1054, 25/e p1075; Shackelford 7/e p1028-1034)

ALK gene mutation is not seen in GIST.

ANAPLASTIC LYMPHOMA KINASE (ALK)

- Anaplastic lymphoma kinase also known as **ALK tyrosine kinase receptor** or **CD246** (cluster of differentiation 246) is an enzyme that in humans is **encoded by the ALK gene**.
- The **2;5 chromosomal translocation** is associated with approximately **60% anaplastic large-cell lymphomas (ALCLs)**. The translocation creates a fusion gene consisting of the ALK (anaplastic lymphoma kinase) gene and the nucleophosmin (NPM) gene: the 3' half of ALK, derived from chromosome 2 and coding for the catalytic domain, is fused to the 5' portion of NPM from chromosome 5.
 - The **EML4-ALK fusion gene** is responsible for approximately 3–5% of **non-small-cell lung cancer (NSCLC)**. Also related to **Neuroblastomas**°.
 - **Germline mutations in the anaplastic lymphoma kinase (ALK) gene** have recently been identified as a **major cause of familial predisposition to neuroblastoma**°.

GASTRIC LYMPHOMA

203. Ans. d. Most common site is fundus (Ref: Sabiston 19/e p1218-1219; Schwartz 10/e p1074, 1084, 9/e p935-937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1035-1042)

Most common site of gastric lymphoma is fundus is an incorrect statement.

GASTRIC LYMPHOMA

- Stomach is **MC site** for lymphoma° in the GIT
 - MC site of gastric lymphoma: **Antrum**°
 - MC gastric lymphoma is **diffuse large B-cell lymphoma**° (55%) > extranodal marginal cell lymphoma (MALT) (40%) > Burkitts lymphoma (3%) > mantle cell and follicular lymphomas.
 - DLBL is MC type of NHL, extranodal lymphoma and GI lymphoma.
 - Stomach, which is devoid of organized lymphoid tissue, is the **MC site** of MALT lymphoma°.
- Clinical Features:**
- Lymphomas occur in **older patients** (sixth and seventh decades)
 - More common in **men**
 - Vague symptoms, namely **epigastric pain**°, early satiety, and fatigue.
 - Constitutional **B symptoms** are **very rare**.
 - Although overt bleeding is uncommon, **more than half** of patients present with **anemia**°.
- Diagnosis:**
- **Endoscopy:** Nonspecific gastritis or gastric ulcerations, with mass lesions being unusual.
 - Evidence of distant disease should be sought through upper airway examination, bone marrow biopsy, and CT of the chest and abdomen to detect lymphadenopathy.
 - Any **enlarged lymph nodes** should undergo **biopsy**.
 - **H. pylori testing** should be performed by histology and, if negative, confirmed by serology.

DAWSON'S CRITERIA

(Requirements for the diagnosis of Primary GI lymphoma)

- Absence of palpable lymphadenopathy°
- Normal bone marrow biopsy and peripheral blood smear°
- Absence of mediastinal lymphadenopathy° on chest radiographs
- Disease grossly confined to the affected viscus°
- Regional lymphadenopathy only°
- Absence of hepatic or splenic involvement° unless via direct extension of the primary tumor.

Staging Systems for Primary Gastrointestinal Non-Hodgkin's Lymphoma		
Ann Arbor	Description	Relative incidence (%)
IE	Tumor confined to gastrointestinal tract	26
IIE	Tumor with spread to regional lymph nodes	26
IIIE	Tumor with nodal involvement beyond regional lymph nodes (para-aortic, iliac)	17
IIIE-IV	Tumor with spread to other intra-abdominal organs (liver, spleen) or beyond abdomen (chest, bone marrow)	31

204. Ans. b. Stomach

205. Ans. a. Chemotherapy; b. Radiotherapy; c. Surgery; d. Anti-H. pylori treatment (Ref: Sabiston 19/e p1219; Schwartz 10/e p1074, 1084, 9/e p936-937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1042)

Treatment of Gastric Lymphoma	
Low-grade MALT	High-grade (aggressive)
<ul style="list-style-type: none"> • Confined to gastric wall and no t(11:18) translocation: H.pylori eradication therapy and re-evaluate at 12 months • Lymph node involvement and t(11:18) translocation: H.pylori eradication therapy and re-evaluate at 3-6 months; if lymphoma persists: <ul style="list-style-type: none"> - Stage I: XRT - Stage II: Chemotherapy + RT • Stage III or IV: H.pylori eradication therapy and Chemotherapy +/- RT 	<ul style="list-style-type: none"> • Stage I, II, III: Chemotherapy + RT • Stage IV: Chemotherapy + RT • Residual disease: Further chemotherapy or Surgery

- External beam radiotherapy: 30 Gy with 10 Gy boost
- Chemotherapy regimens cyclophosphamide, doxorubicin, vincristine, prednisone (CHOP) +/- rituximab
- Rituximab is chimeric monoclonal antibody against CD-20, preferred for high grade MALT or DLBL.

206. Ans. d. Intractable pain (Ref: Sabiston 19/e p1219, 18/e p1270-1271; Bailey 26/e p1054, 25/e p1075; Oxford Surgery 5/e p174)

Indications of Surgery in Gastric Lymphoma	
<ul style="list-style-type: none"> • Failure of chemoradiation^Q • Hemorrhage^Q 	<ul style="list-style-type: none"> • Obstruction^Q • Perforation^Q

207. Ans. c. Total gastrectomy with adjuvant chemotherapy 208. Ans. d. Intractable pain

209. Ans. b. Gastric resection and chemotherapy (Ref: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2117016/>)

PRIMARY GASTRIC HODGKIN'S DISEASE

- Primary gastric Hodgkin's disease is extremely rare (<1% of all gastric lymphomas)
 - Stomach is the MC site of primary extranodal lymphoma^Q in adults
- Etiology:**
- Association of classic Hodgkin's disease with EBV^Q
 - LMP1 (Latent Membrane Protein 1) an essential EBV protein, commonly expressed and associated with the pathogenesis of Hodgkin's disease^Q
- Diagnosis:**
- Endoscopy: Non-specific gastritis or peptic ulcers with mass lesions^Q
 - A full panel of immunohistochemical markers is essential to make an accurate diagnosis of gastric Hodgkin's disease.
- Treatment:**
- Hodgkin's disease of the stomach has been treated by surgery while post operative chemotherapy has been employed for systemic disease^Q.
- Prognosis:**
- Prognosis is poor with 45-60% of patients dying within the first year of diagnosis

210. Ans. d. Clinically can be easily differentiated from gastric adenocarcinoma by the presence of early satiety and prominent lymph node metastases

DUODENAL ATRESIA

211. Ans. a. Down's syndrome (Ref: Sabiston 19/e p1841-1842; Schwartz 10/e p1612, 1615-1616, 9/e p1427-1428; Bailey 26/e p120, 25/e p85; Shackelford 7/e p811-813)

DUODENAL ATRESIA

- Occurs as a **result of failure of vacuolization** of the **duodenum** from its solid cord stage.

Anatomic variants of Duodenal Atresia

- Duodenal **stenosis**
- Mucosal web** with intact muscular wall (**windsock deformity**)
- Two ends separated by a **fibrous cord**
- Complete separation with a gap** within the duodenum.

Associated Anomalies

- Prematurity, Down syndrome, polyhydramnios^Q
- Malrotation, annular pancreas, biliary atresia^Q
- Cardiac, renal, esophageal, and anorectal anomalies

Clinical Features:

- In most cases, the **duodenal obstruction** is **distal to the ampulla of Vater**, and infants present with **bilious emesis** in the **neonatal period**^Q.

Diagnosis

- X-ray abdomen: **Double-bubble sign** (air-filled stomach and duodenal bulb^Q).

- Diagnosis is confirmed**, if there is **no distal air**^Q.
- If distal air is **present**, an **upper GI contrast study** is **performed rapidly**, not only to **confirm the diagnosis** of duodenal atresia but also to **exclude midgut volvulus**^Q.

Treatment:

- Diamond-shaped duodenoduodenostomy** is the **treatment of choice**^Q.

212. Ans. b. Duodenal atresia

213. Ans. b. Duodenal atresia

214. Ans. a. Duodenoduodenostomy

Single bubble sign	Congenital Hypertrophic Pyloric Stenosis ^Q
Double bubble sign	Duodenal atresia ^Q , Annular pancreas
Triple bubble sign	Jejunal atresia ^Q

INFANTILE HYPERTROPHIC PYLORIC STENOSIS

215. Ans. a. Hypokalemia; b. Hypochloremic metabolic alkalosis (Ref: Sabiston 19/e p1841; Schwartz 10/e p1613-1614, 9/e p1425-1426; Bailey 26/e p113-114, 25/e p78-79; Shackelford 7/e p813-816)

INFANTILE HYPERTROPHIC PYLORIC STENOSIS

- In HPS, **hypertrophy** of the **circular muscle**^Q of the **pylorus** results in **constriction** and **obstruction** of the gastric outlet.
- Acquired condition**
- Incidence** of **1 in 3000 to 4000**^Q live births.
- This condition is **most common between** the ages of **3–6 weeks**^Q.
- Associated anomalies** in **6–20%** cases: Esophageal atresia, Hirschprung's disease, ARM and malrotation

Etiology

- Ethnic origin** is important because the **highest incidence** is found among **whites of Scandinavian**^Q decent and **lowest risk** among **African Americans** and **Chinese**.

- Males outnumber females** by a ratio of **4:1**^Q
- First-born males**^Q are frequently encountered.

- Higher risk** for developing HPS in **offspring of parents**^Q with this condition

Clinical Presentation:

- Infant is **normal at birth**, **symptomatic between** the ages of **3–6 weeks**^Q
- Infants with HPS typically present with **projectile nonbilious vomiting**^Q.

- Visible gastric peristalsis** may be seen as a wave of contraction **from the left upper quadrant to the epigastrium**^Q.

- The infants usually **feed vigorously** between episodes of vomiting.
- Typical electrolyte abnormality: **Hypochloremic, hypokalemic, metabolic alkalosis** with **paradoxical aciduria**^Q.

Diagnosis:

- Palpation of the pyloric tumor or olive** in the epigastrium or right upper quadrant by a skilled examiner is **pathognomonic** for the diagnosis of HPS^Q.

- If the olive is palpated, **no additional diagnostic testing** is necessary^Q.
 - When the olive **cannot be palpated**, the diagnosis of HPS can be made with an **ultrasound exam** or fluoroscopic UGI series.
 - Absence of radiation exposure and cost make the **ultrasound** the **usual preferred study**^Q.
 - **Diagnostic Sonographic measurements:**
 - **Pyloric wall thickness** of at least **4 mm**^Q
 - **Channel length** of at least **17 mm**^Q
 - **Barium Meal:**
 - **String sign**^Q: indicating a narrowed elongated pyloric canal that does not relax is seen
 - **Shoulder sign**^Q: caused by the hypertrophied muscle indenting the antrum
 - **Double-track sign**^Q: caused by the redundant mucosa
- Treatment:**
- Pyloric stenosis is **never a surgical emergency** although dehydration and electrolyte abnormalities may present a **medical emergency**^Q
 - **Fluid resuscitation** and **correction of electrolyte abnormalities**^Q and metabolic alkalosis is essential before surgery.
 - It is important that the underlying metabolic alkalosis is **slowly corrected** with **normal saline**.
 - Treatment of HPS is by a **Ramstedt-Fredet pyloromyotomy** (**cutting across the abnormal pyloric musculature**^Q while preserving the underlying mucosa).
- Postoperative care:**
- Postoperatively, infants are usually allowed to resume enteral feedings.
 - **Vomiting** after surgery occurs frequently but is **usually self-limited**^Q.
 - **Complications:** Incomplete myotomy, **mucosal perforation** (usually at the duodenal end), and wound infection.
 - If the **mucosa** is **inadvertently opened** then **feeding is delayed for 48 hours**^Q.

216. Ans. c. Correction of electrolyte disturbances 217. Ans. c. Ultrasound abdomen
 218. Ans. c. Metabolic acidosis 219. Ans. a. Mass in epigastrium
 220. Ans. a. Hypertrophic pyloric stenosis 221. Ans. b. CHPS
 222. Ans. b. The pyloric tumour is best felt during feeding 223. Ans. c. Metabolic alkalosis with paradoxical aciduria
 224. Ans. d. Metabolic acidosis
 225. Ans. b. Non-bilious vomiting; c. Projectile vomiting; d. Non-projectile vomiting; e. Forceful vomiting (Ref: Nelson 18/e p1274-1275)

- Vomiting may or may not be projectile, but it is **non-bilious**.
- In 10–15% of infants, vomitus **may contain blood**. This bleeding is due to reflux **esophagitis**, a common association with hypertrophic pyloric stenosis.

226. Ans. b. Aciduria 227. Ans. c. Acidosis 228. Ans. d. Pyloric stenosis
 229. Ans. b. Circular muscle fibers 230. Ans. c. 48 hours 231. Ans. d. High gastric residue
 232. Ans. a. Pyloromyotomy

TREATMENT OF INFANTILE HYPERTROPHIC PYLORIC STENOSIS

- IHPS is a **medical emergency**^Q.
 - **Immediate treatment** requires **correction of fluid loss, electrolytes, and acid-base imbalance**.
 - Once intravenous access is obtained, an **initial fluid bolus (20 mL/kg)** of **crystalloids** should be infused immediately if the infant is dehydrated.
 - Infants should receive 15–2 times maintenance intravenous fluid: 5% dextrose in 0.25% or 0.33% sodium chloride with 2–4 mEq KCl per 100 mL replacement^Q.
 - **Definitive treatment: Ramstedt pyloromyotomy**^Q
233. Ans. a. Congenital hypertrophic pyloric stenosis
 234. Ans. e. Normal saline with potassium (Ref: Sabiston 19/e p1196-1197; Schwartz 9/e p921; Bailey 26/e p1044-1045, 25/e p1065-1066; Shackelford 7/e p716-717)

Fluid resuscitation requires replacement of the chloride and potassium deficiencies.

GASTRIC OUTLET OBSTRUCTION

- In cases of **prolonged vomiting**, patients may become **dehydrated** and develop a **hypochloremic hypokalemic metabolic alkalosis** secondary to **loss of gastric juice** rich in **hydrogen, chloride, and potassium ions**^Q.
- In this setting, **fluid resuscitation** requires **replacement of the chloride and potassium deficiencies** in addition to **nasogastric suction** for relief of the obstructed stomach^Q.

235. Ans. d. Visible peristalsis is always seen
 236. Ans. d. Congenital hypertrophic pyloric stenosis

GASTRIC OUTLET OBSTRUCTION

237. Ans. c. Hypokalemic metabolic alkalosis; d. Paradoxical aciduria (Ref: Sabiston 19/e p1196-1197; Schwartz 9/e p921; Bailey 26/e p1056-1047, 25/e p1065-1066; Shackelford 7/e p716-717)

GASTRIC OUTLET OBSTRUCTION

- MC cause of gastric outlet obstruction: CA stomach^Q
- Site of stenosis or obstruction in peptic ulcer disease: 1st part of the duodenum^Q
- More common with duodenal ulcer and type III gastric ulcer and requires that malignancy should be ruled out.

Clinical Features:

- Symptoms of gastric retention, including early satiety, bloating, indigestion, anorexia, nausea, vomiting, epigastric pain, and weight loss.
- Patients are frequently malnourished and dehydrated and have a metabolic alkalosis, factors that increase operative risk.

Diagnosis:

- A saline load test is helpful, it is performed by emptying the stomach with a nasogastric tube and instilling 750 mL of saline, the patient is placed in sitting position, and 30 minutes later the nasogastric tube is aspirated, normally < 400 mL should remain in the stomach, and 90% of subjects have a residue of less than 200 mL.
- The finding of > 400 mL residual saline is consistent with a diagnosis of gastric outlet obstruction.

Treatment:

- Surgery is generally indicated if the obstruction fails to resolve despite 48–72 hours of adequate IV fluid replenishment, antisecretory therapy and nasogastric decompression^Q.

- Truncal vagotomy and antrectomy^Q is the ideal procedure.

- The inflammation and scarring at duodenal bulb or previous proximal duodenal surgeries prevents safe performance of an antrectomy, in this setting truncal vagotomy with drainage (Gastrojejunostomy) is the preferred approach^Q.

238. Ans. d. First part of duodenum
 239. Ans. a. Hypokalemic hypochloremic alkalosis
 240. Ans. a. Pyloric obstruction
 241. Ans. b. Cancer of stomach
 242. Ans. c. Resolves spontaneously without treatment
 243. Ans. c. Truncal vagotomy with gastrojejunostomy
 244. Ans. b. Gastric outlet obstruction
 245. Ans. a. Acidosis
 246. Ans. b. Pylorus (Ref: http://www.anaesthesiamcq.com/AcidBaseBook/ab7_2.php)

- Gastric alkalosis is most marked with vomiting due to pyloric stenosis or obstruction because the vomitus is acidic gastric juice only^Q.
- Vomiting in other conditions may involve a mixture of acid gastric loss and alkaline duodenal contents^Q and the acid-base situation that results is more variable.
- Loss of alkaline small intestinal contents can even result in an acidosis if gastric acid secretion is suppressed^Q.

247. Ans. a. Alkaline urine
 248. Ans. c. Surgery (Ref: Bailey 26/e p1056, 25/e p1077)

ACUTE GASTRIC DILATATION

- This condition usually occurs in association with pyloroduodenal disorders or after surgery without nasogastric suction^Q.
- The stomach, which may also be atonic, dilates enormously^Q.
- Often the patient is also dehydrated and has electrolyte disturbances.
- Failure to treat this condition can result in a sudden massive vomit with aspiration into the lungs^Q.
- Treatment:
- Nasogastric suction with a large-bore tube, fluid replacement and treatment of the underlying condition^Q.

249. Ans. a. Dilatation of stomach seen on x-ray; b. Presents with vomiting; c. Aspiration; e. Atony of stomach

BEZOARS

250. Ans. c. GI obstruction (Ref: Sabiston 19/e p1224; Schwartz 10/e p1089, 9/e p941; Bailey 26/e p1056, 25/e p1077; Shackelford 7/e p805)

Symptoms of Trichobezoar: Pain from gastric ulceration and fullness from gastric outlet obstruction with occasional gastric perforation and small bowel obstruction.

BEZOARS

- Bezoars are **collections of nondigestible materials**, usually of vegetable origin (phytobezoar) but also of hair (trichobezoar).
- **Four types of Bezoar:** Phytobezoars, Trichobezoars, Pharmacobezoar and Lactobezoar

Phytobezoar:

- **Most common type**^Q, a high concentration of tannin, exposed to gastric acid form a coagulum leading to bezoar formation
- **Most commonly** found in patients who have undergone **surgery** of the **stomach** and have **impaired gastric emptying**^Q.
- **Diabetics with autonomic neuropathy**^Q are also at risk.

- **Symptoms:** Early satiety, nausea, **pain**, **vomiting**, and **weight loss** with palpable **large mass**^Q
- **Diagnosis** confirmed by a **barium examination** or **endoscopy**^Q.

- **Enzymatic therapy** to attempt dissolution of the bezoar. **Papain** and **cellulase** have been used with some success.
- Generally, **enzymatic débridement** is followed by **aggressive Ewald tube lavage** or **endoscopic fragmentation**^Q. Failure of these therapies would necessitate surgical removal.

Trichobezoar:

- Concretions of hair, generally found in **long-haired girls** or **women** who often deny eating their own hair (**trichophagy**)^Q.
- Typically **black** regardless of the color of the hair ingested because of enzymatic oxidation of gastric acid

- **Most common type** in **Children**^Q
- **Trichobezoars** are **most likely** to **require surgical management**^Q
- **Rapunzel Syndrome:** Gastric trichobezoars with a long **extension** of hairs that **trails into the duodenum**.

- **Symptoms:** Pain from **gastric ulceration** and fullness from **gastric outlet obstruction** with occasional **gastric perforation** and **small bowel obstruction**^Q.
- Small trichobezoars may respond to endoscopic fragmentation, vigorous lavage, or enzymatic therapy.
- **Larger trichobezoars** require **surgical removal**^Q.
- The trichophagy requires **psychiatric care**^Q because recurrent bezoar formation is common.

Lactobezoar:

- Compact mass of **undigested milk concretions** and have been linked to nearly every **commercially available infant formula** and **breast and cow milk**
- Treated by **withholding oral feedings**
- Recurrence has never been reported after again feeding milk

251. Ans. d. Malignancy

252. Ans. a. Trichobezoar

253. Ans. a. It is caused by Trichuris

STRESS GASTRITIS

254. Ans. c. Surgery involves anterior gastrotomy with ligation of bleeding ulcers and superficial erosions (Ref: Sabiston 19/e p1167-1168; Schwartz 10/e p1073-1074, 9/e p925; Bailey 25/e p1053; Shackelford 7/e p728)

STRESS GASTRITIS (STRESS ULCERATIONS/ STRESS EROSION GASTRITIS/ HEMORRHAGIC GASTRITIS)

- Characterized by **multiple, superficial** (nonulcerating) **erosions** that **begin in the proximal** or **acid-secreting portion** of the stomach and **progress distally**^Q.
- **Almost always** seen in the **fundus**^Q and **rarely** in the **distal stomach**.

- **Cushing's ulcer:** Occur in the setting of central nervous system disease (**Head trauma**)^Q
- **Curling's ulcer:** as a result of **thermal burn injury** involving > 35% of BSA^Q

- **Increased acid secretion** in **Cushing's ulcer** but **not in Curling's ulcer**^Q

Pathophysiology:

- Multifactorial etiology

- **Impaired mucosal defense** mechanisms against luminal acid such as a **reduction in blood flow**, **mucus**, and **bicarbonate secretion** by mucosal cells, or a **reduction in endogenous prostaglandins**^Q.

- In stress (**hypoxia**, **sepsis**, or **organ failure**), **mucosal ischemia** is the **main factor** responsible for the **breakdown** of these **normal defense mechanisms**^Q.

Risk factors or Predisposing clinical conditions

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> • ARDS^Q • Multiple trauma^Q • Major burn > 35% of BSA^Q | <ul style="list-style-type: none"> • Hepatic dysfunction^Q • Oliguric renal failure^Q • Large transfusion^Q requirements | <ul style="list-style-type: none"> • Hypotension^Q • Prolonged surgical procedures^Q • Sepsis^Q |
|--|--|---|

Clinical Features:

- More than 50% of patients develop their **stress gastritis** within 1–2 days after a traumatic event.
- The only clinical sign may be **painless upper GI bleeding** that may be delayed at onset.
- The **bleeding** is usually **slow** and **intermittent**^Q

Diagnosis:

- **Endoscopy** is required to **confirm the diagnosis**^Q and to differentiate stress gastritis from other sources of GI hemorrhage.

Treatment:

- **Definitive fluid resuscitation** with **correction** of any **coagulation abnormalities** and **treatment of the underlying sepsis**^Q
- **Intraluminal gastric pH** should be maintained >5.0 with **antisecretory agents**.
- Most of the **superficial erosions** are not actively bleeding and therefore **do not require ligature** unless a **blood vessel** is seen at its base^Q.

- The operation is completed by **closing the anterior gastrotomy** and performing a **truncal vagotomy** and **pyloroplasty**^Q to reduce acid secretion.

Prophylaxis:

- **Complete neutralization** of **luminal acid** or **antisecretory therapy** precludes the development of experimental stress gastritis^Q.
- **Sepsis control**, **ventilatory support**, adequate **nutrition** and correction of dyselectrolytemia^Q
- **Drugs** used are: Antacids, H₂-receptor antagonists and sucralfate

255. Ans. c. Elective ventilation

256. Ans. d. Increased H. pylori infection

257. Ans. a. Fundus of stomach

258. Ans. d. Distal duodenum

259. Ans. b. Stomach

260. Ans. b. Fundus

261. Ans. a. Burn patients

- **Cushing ulcer:** Stress gastritis due to **intracranial injury/increased ICP**^Q
- **Curling ulcer:** After **burn injury** (> 35%); in the **body** and **fundus**^Q; not in antrum and duodenum
- **Cameron ulcers** or **riding ulcers:** Linear gastric erosions in **hiatal hernias**^Q

262. Ans. b. Are solitary penetrating ulcer; d. Has also been described in children after head injury or craniotomy

263. Ans. c. Penicillin therapy

264. Ans. a. 1st part of duodenum

GASTRIC VOLVULUS

265. Ans. c. Endoscopy usually derotate (Ref: Sabiston 19/e p1223; Schwartz 10/e p1090, 9/e p941; Shackelford 7/e p876-878; Bailey 26/e p1055)

GASTRIC VOLVULUS

- **Organoaxial (two thirds):** Torsion occurs along the stomach's **longitudinal axis**^Q
- **Mesenteroaxial (one third):** Torsion occurs along the **vertical axis**^Q

Primary Gastric Volvulus	Secondary Gastric Volvulus
<ul style="list-style-type: none"> • Seen in association with congenital asplenia and wandering spleen^Q • Usually mesenteroaxial^Q • Partial (<180 degree) and recurrent^Q • Not associated with a diaphragmatic defect 	<ul style="list-style-type: none"> • Occur secondary to some anatomic abnormality, (Most commonly diaphragmatic hernia)^Q • Usually organoaxial^Q • Paraesophageal hiatal hernia is the most common cause in adults and congenital diaphragmatic hernia (Bochdalek hernia) in children^Q

Clinical Features:

- **Organoaxial gastric volvulus** occurs **acutely** and is associated with a diaphragmatic defect
- **Mesenteroaxial volvulus** is **partial** (< 180 degrees), **recurrent**, and not associated with a diaphragmatic defect.
- The major symptoms at presentation are **abdominal pain** that is acute in onset, distention, vomiting, and **upper GI hemorrhage**^Q.

- **Borchardt's triad:** (Epigastric pain + **Inability to vomit** + **Inability to pass a nasogastric tube**) is characteristic feature of gastric volvulus^Q.

Diagnosis:

- **X-ray abdomen:** Gas-filled viscus in the **chest** or upper abdomen^Q.
- The **diagnosis** can be **confirmed** by **barium** contrast study or **endoscopy**^Q.

Treatment:

- **Acute volvulus:** It is a surgical emergency. Stomach is reduced and uncoiled. The diaphragmatic defect is repaired with consideration given to a fundoplication in the setting of a paraesophageal hernia^Q.
- In **strangulation** (5–28%), the **compromised segment** of stomach is **resected**^Q.
- **Spontaneous volvulus**, without an associated diaphragmatic defect, is treated by **detorsion** and **fixation** of the stomach by gastropexy or tube gastrostomy^Q.

266. Ans. b. Acute gastric volvulus

267. Ans. b. Vomiting

STOMACH ANATOMY AND PHYSIOLOGY

268. Ans. c. Proximal branch of posterior vagus (Ref: Sabiston 19/e p1183-1184; Schwartz 10/e p1035-1040, 9/e p892-894; Bailey 26/e p1023-1025, 25/e p1045-1047; Shackelford 7/e p845)

STOMACH INNERVATION

- The extrinsic innervation of the stomach is both **parasympathetic through the vagus** and **sympathetic through the celiac plexus**.
- The **vagus nerve originates** in the **vagal nucleus** in the **floor of the fourth ventricle** and **traverses the neck** in the **carotid sheath** to enter the **mediastinum**, where it **divides into several branches around the esophagus**. These branches coalesce above the esophageal hiatus to form the left and right vagus nerves.

- At the GE junction, the **left vagus is anterior**, and the **right vagus is posterior** (LARP mnemonic)^Q.

Left vagus	Right vagus
<ul style="list-style-type: none"> • At the GE junction, left vagus is anterior^Q • Left vagus gives off the hepatic branch to the liver^Q and then continues along the lesser curvature as the anterior nerve of Latarjet^Q. 	<ul style="list-style-type: none"> • At the GE junction, right vagus is posterior^Q • Criminal nerve of Grassi^Q is the first branch of the right or posterior vagus nerve and is recognized as a potential etiology of recurrent ulcers when left undivided^Q. • Right vagus also gives a branch off to the celiac plexus^Q and then continues posteriorly along the lesser curvature.

Truncal vagotomy	• Performed above the celiac and hepatic branches of the vagi ^Q
Selective vagotomy	• Performed below the celiac and hepatic branches of the vagi ^Q
Highly selective vagotomy	• Performed by dividing the crow's feet to the proximal stomach while preserving the innervation of the antral and pyloric parts of stomach ^Q .

269. Ans. b. Body (Ref: Shackelford 7/e p781; 6/e p729)

Shackelford "The **gastric pacemaker**, which is **located in the body along the greater curvature**, stimulates both the filling and mixing of food in the body and antrum."

GASTRIC MOTILITY

- **Gastric pacemaker:** Interstitial cells of Cajal (ICCs)^Q
- **Location:** In **body**^Q along the **greater curvature**
- ICCs are **critical for the generation of sequential contractions**^Q

270. Ans. a. Protects epithelium

271. Ans. c. Pyloric antrum (Ref: Sabiston 19/e p1184)

Location	Cells
Gastric Body	MCD PIE (Mucus cells, Chief cells, D cells, Parietal cells, Interneurons and ECL cells) ^Q
Gastric antrum	MD GI (Mucus cells, D cells, G cells and Interneurons) ^Q

- **Parietal cells** secrete Ghrelin, Intrinsic factor, Leptin and Acid. (GILA)^Q
- **Chief cells** secrete **pepsin** and **leptin**^Q

- **Stomach Histology (CMPE):** Chief cells (44%) > Mucous cells (40%) > Parietal cells (13%) > Endocrine cells (3%)^Q

GASTRIC MORPHOLOGY

- **Muscularis mucosa** is responsible for the **rugae**^Q that greatly **increases surface area** and also **marks the microscopic boundary** for invasive and non-invasive gastric carcinoma.
- **Submucosa** is the **strongest layer**^Q of the gastric wall.
- **Muscularis propria** consists of **three layers**^Q of smooth muscle. The **middle layer** is circular and is the **only complete muscle layer** of the stomach wall, this layer becomes **progressively thicker** toward the **pylorus**, where it becomes as a true anatomic sphincter.

EMBRYOLOGY OF STOMACH

- The stomach arises as a **dilatation** in the **tubular embryonic foregut**^Q
- Assumes its **normal asymmetric shape** and **position** by the end of the **7th week**^Q.
- During the **6th to 10th week** as the stomach enlarges it also **rotates 90 degrees** in a **clockwise direction**^Q.

272. Ans. c. Duodenum (Ref: Sabiston 19/e p1229; Shackelford 7/e p826)

- **Brunner's Gland:** Submucosal gland found in the **duodenum**^Q

273. Ans. a. Stimulation of appetite (Ref: Sabiston 19/e p1186; Schwartz 10/e p22,1045,1047,1348, 9/e p1176-1177; Shackelford 7/e p645-646)

GHRELIN

- Secreted by **oxyntic cells** in the **fundus** of the stomach^Q
- First gut peptide found to have **orexigenic (appetite stimulating)** properties^Q.
- Circulating levels of ghrelin are **inversely related** to **BMI, adipose tissue mass** and **plasma insulin** levels^Q.

Primary effects of Ghrelin

- **Motilin like effects** on gastric motility^Q
- **Stimulates release of growth hormone** from pituitary^Q
- **Stimulates release of somatostatin** and **PP**^Q

274. Ans. c. Splenic artery (Ref: Sabiston 19/e p1182; Bailey 25/e p1045)

- **Posterior gastric artery** is a branch of **splenic artery**^Q.

GASTRIC DIVERTICULUM

275. Ans. b. Usually at cardiac end; c. Usually on posterior surface (Ref: Schwartz 9/e p941)

GASTRIC DIVERTICULA

- Gastric diverticula are **usually solitary** and may be **congenital** or **acquired**^Q.
- **Congenital diverticula** are **true diverticula** and contain a full coat of muscularis propria, whereas **acquired diverticula** (perhaps caused by pulsion) usually have a **negligible outer muscle layer**^Q.
 - **Most gastric diverticula** occur in the **posterior cardia** or **fundus**^Q.
 - **Most of the time gastric diverticula** are **asymptomatic**^Q.
- However, they **can become inflamed** and may **produce pain** or **bleeding**^Q.
- **Perforation** is rare.

Treatment:

- **Asymptomatic diverticula** do not require treatment^Q
- **Symptomatic lesions** should be **removed**. This can often be done **laparoscopically**^Q.

276. Ans. d. Pain

MISCELLANEOUS

277. Ans. b. T.B., c. CA pancreas, d. Crohn's disease: Gastrointestinal Radiology 2nd/84

Causes of Duodenal Stricture

- | | |
|--|--|
| <ul style="list-style-type: none"> • Chronic peptic ulcer^Q disease • Crohn's disease^Q • Tuberculosis^Q | <ul style="list-style-type: none"> • CA head of pancreas^Q • Annular pancreas^Q • Pancreatitis^Q • Cholecystitis |
|--|--|

278. Ans. a. Eagle-Barrett syndrome (Ref: Schwartz 10/e p1634, 9/e p1443-1444)

EAGLE-BARRETT SYNDROME OR PRUNE-BELLY SYNDROME

- Prune-belly syndrome describes the **wrinkled appearance** of the **anterior abdominal wall** that characterizes these patients^Q.
- Also known as **Eagle-Barrett syndrome** and the **triad syndrome** because of its **three major manifestations**^Q.

Characterized by

- **Extremely lax lower abdominal musculature**^Q
- **Dilated urinary tract** including the bladder^Q
- **Bilateral undescended testes**^Q

- The incidence is **significantly higher** in males^Q.
- Most significant comorbidity: **Pulmonary hypoplasia** (lead to death in the most severe cases)^Q
- Skeletal abnormalities include **dislocation** or **dysplasia** of the **hip** and **pectus excavatum**^Q.

Genitourinary Manifestation

- **Major genitourinary manifestation: Ureteral dilatation**^Q
- **Ureters** are **typically long** and **tortuous**, and become **more dilated distally**.
- **Ureteric obstruction** is **rarely present**^Q.
- The **dilatation** is thought to be **caused by decreased smooth muscle** and **increased collagen** in the ureters^Q.
- Approximately **80%** of affected individuals have **some degree of VUR**, which can **predispose to UTI**^Q.

- Most children have adequate renal parenchyma for growth and development^Q.

Treatment:

- **Ureteric surgery** has **no role** unless an area of **obstruction** develops.
- **Bilateral orchidopexy** can be performed in conjunction with **abdominal wall reconstruction** at **6-12 months** of age^Q.

279. Ans. c. Pernicious anemia (Ref: Sabiston 19/e p1186)

Causes of Hypergastrinemia

Ulcerogenic Causes

- **Antral G-cell hyperplasia** or **hyperfunction**^Q
- **Retained excluded antrum**^Q
- **Zollinger-Ellison syndrome**^Q
- **Gastric outlet obstruction**^Q
- **Short-gut syndrome**^Q

Non-ulcerogenic Causes

- **Antisecretory agents (PPIs)**^Q
- **Atrophic gastritis**^Q
- **Pernicious anemia**^Q
- **Acid-reducing procedure (vagotomy)**
- **H. pylori infection**^Q
- **Chronic renal failure**^Q

280. Ans. b. Gastric ulcer

Hour-Glass Stomach

- Hour-glass stomach is caused by **cicatricial contraction** of a **saddle shaped ulcer** at the **lesser curvature**^Q

TEA-POT STOMACH (HAND-BAG STOMACH)

- Tea-pot stomach is caused by **longitudinal shortening** of **gastric ulcer** at the **lesser curvature** of stomach (stomach looks like tea-pot)^Q

281. Ans. c. Ba enema

282. Ans. a. Most common small bowel carcinoma; b. Type of periampullary carcinoma; c. Jaundice and anemia-most common symptom (Ref: Sabiston 19/e p1263; Schwartz 9/e p999; Bailey 25/e p1076; Shackelford 7/e p779)

DUODENAL ADENOCARCINOMA

- Duodenum is **MC site** of **small intestinal adenocarcinoma**^Q
- 15% in the proximal; 40% in the middle and **45%** in the **distal duodenum (MC)**^Q
- **Resectability** and **prognosis** are **better** than other upper GI cancers.

Clinical Features

- Most often presents as **obstruction**, with **nausea**, **vomiting**, and **abdominal pain** as the most frequent symptoms.
- **Anemia** from **bleeding** and **biliary** or **pancreatic obstructive symptoms** can also be seen on initial presentation if the tumor is located within the **periampullary region**^Q.

Diagnosis

- Endoscopy is the **diagnostic test of choice** for duodenal tumors^Q, which allows for direct **visualization** and **biopsy** as needed.

Treatment

- For 1st or 2nd portion: **Whipple procedure**^Q
- For 3rd or 4th portion: **Segmental duodenal resection**^Q

283. Ans. d. Up to 50 cm (Ref: Narayan Reddy 20/e p431)

- In adults, gastric lavage tube should be passed upto 50 cm mark^Q.

284. Ans. c. Amyloidosis

285. Ans. d. Pancreatic injury; e. Duodenal injury (Ref: Sabiston 19/e p462-463; Shackelford 7/e p688)

MANAGEMENT OF GRADE IV AND V PANCREATIC INJURIES

- Due to short of radical resection, other **options designed to divert gastric, pancreatic, and biliary secretions away from the duodenum** need to be considered for the management of patients with **grade IV and V pancreatic injuries**^Q.
- These include **duodenal diverticularization, pyloric exclusion or gastrojejunostomy, and triple-tube decompression**^Q.
 - **Duodenal diverticularization** is accomplished by performing **antrectomy and gastrojejunostomy** to achieve gastric diversion, **choledochostomy** to divert bile if the ampulla is injured, **tube duodenostomy** for decompression of the duodenum, **suture repair of any duodenal injuries**, and **extensive periduodenal and peripancreatic drainage**^Q.
- When **pancreatic injuries** are associated with **major duodenal injuries**. **Drainage or resection of the pancreas** can be **combined with suturing or stapling of the pylorus (pyloric exclusion procedure)** to divert gastric flow from the duodenum^Q.
- Gastrointestinal continuity is then accomplished by **gastrojejunostomy**.
- It is quite remarkable that gastroduodenal continuity is re-established 4 to 6 weeks after pyloric exclusion even when heavy non-absorbable sutures or staples are used.
- The **pyloric exclusion** procedure has **largely replaced the duodenal diverticularization** procedure, which entails antrectomy and gastrojejunostomy, as well as drainage and decompression of the duodenal injury and drainage of the pancreatic injury.

286. Ans. a. Gastric antrum is predominantly affected

- **Type A gastritis** primarily involves **body and fundus**^Q

287. Ans. b. > 10 cm (Ref: Shackelford 7/e p895; Sabiston 19/e p1251)

- **Finney stricturoplasty** is used for **strictures > 10–15 cm**^Q.
- **Heineke-Mikulicz stricturoplasty** is appropriate strictures < 10 cm^Q in length.

288. Ans. b. 15 cm (Ref: Shackelford 7/e p810; www.surgery.usc.edu/foregut/demeesterpub/235. Ans.pdf)

HUNT-LAWRENCE POUCH

- **Jejunal reservoir (Hunt-Lawrence pouch)** is used for the treatment of **microgastrica**.
- **Length of pouch: 12–15 cm**^Q
- **Length of jejunal limb used: 35–40 cm**^Q

IMPORTANT TOPICS

Gastrectomy	
Antrectomy or distal gastrectomy	• Removal of distal 1/3rd of stomach ^Q
Hemigastrectomy	• Removal of half of stomach ^Q
Subtotal gastrectomy	• Removal of 2/3rd of stomach ^Q
Total gastrectomy	• Removal of whole stomach ^Q

- **No lymph node metastasis** in GIST and Phyllodes tumor (No role of lymphadenectomy)^Q.
- **Lymph node metastasis** in gastrinoma doesn't depend on size or location of tumor and doesn't affect survival^Q.

HOLLANDER TEST

- **Test for function of the vagus nerve** (as after vagotomy for peptic ulcer) in which **insulin is administered to induce hypoglycemia** and gastric acidity tends to increase if innervation by the vagus nerve **remains** and **decrease** if severance is complete.

Peritoneum

MULTIPLE CHOICE QUESTIONS

RETROPERITONEAL FIBROSIS

1. Ormond's disease is: (MHPGMCET 2009, 2007)
 - a. Retractable testis
 - b. Idiopathic retroperitoneal lymphadenopathy
 - c. Idiopathic retroperitoneal fibrosis
 - d. Idiopathic mediastinitis
2. Retroperitoneal fibrosis most commonly presents with:
 - a. Pedal edema
 - b. Ascites (JIPMER 2011)
 - c. Ureteric obstruction
 - d. Back pain
3. Most common organ involved in retroperitoneal fibrosis is: (Recent Question 2014, AIIMS Nov 93)
 - a. Aorta
 - b. Ureter
 - c. Inferior vena cava
 - d. Sympathetic nerve plexus
4. Localized idiopathic fibrosis is seen in all of the following except: (UPSC 2001)
 - a. Riedel's struma
 - b. Hypertrophic scar
 - c. Sclerosing cholangitis
 - d. Panniculitis

PERITONITIS

5. All are true about SBP except: (ILBS 2012)
 - a. In hospital mortality rate is 20%
 - b. Neutrocytic ascites has better prognosis
 - c. Norfloxacin is useful for prevention
 - d. Cefotaxime is used for treatment
6. False about retroperitoneal fibrosis is: (Recent Question 2015)
 - a. Ureter is most commonly involved
 - b. More common in females
 - c. Primary idiopathic form is called Ormond's disease
 - d. Corticosteroids are mainstay of treatment
7. Emergency operation done in cases of: (PGI Nov 2010)
 - a. Volvulus
 - b. Obstructed hernia
 - c. Appendicular perforation with paralytic ileus
 - d. Toxic megacolon
 - e. Colonic perforation
8. Investigation for acute abdomen includes: (PGI May 2010)
 - a. USG
 - b. Multidetector CT
 - c. Contrast enhanced CT
 - d. X-ray abdomen
 - e. Echocardiography
9. A post-op patient presents with peritonitis and massive contamination because of duodenal leak. Management of choice is: (AIIMS June 2001)
 - a. Four quadrant peritoneal lavage
 - b. Duodenostomy + Feeding jejunostomy + Peritoneal lavage
 - c. Total parenteral nutrition
 - d. Duodenojejunostomy
10. In which of the following condition, air under both sides of diaphragm is visualized? (PGI Dec 2001, June 2001)
 - a. Perforated Meckel's diverticulum
 - b. Uterine rupture following illegal abortion
 - c. Perforation of duodenal ulcer
 - d. Liver abscess
 - e. Appendicular perforation
11. Which of the following causes least irritation of the peritoneal cavity? (All India 99)
 - a. Bile
 - b. Blood
 - c. Gastric enzyme
 - d. Pancreatic enzyme
12. Most common cause of peritonitis in adult male is: (Recent Question 2014, All India 93)
 - a. Duodenal ulcer perforation
 - b. Abdominal tuberculosis
 - c. Enteric perforation
 - d. Perforated appendix
13. Apart from Escherichia coli, the other most common organism implicated in acute suppurative bacterial peritonitis is: (Recent Question 2014, All India 2006)
 - a. Bacteroides
 - b. Klebsiella
 - c. Peptostreptococcus
 - d. Pseudomonas
14. Primary peritonitis with pneumococcus is associated with: (UPSC 86, JIPMER 88)
 - a. Lymphomas
 - b. Nephrotic syndrome
 - c. Carcinoids
 - d. None of the above
15. Generalized diffuse peritonitis has been compared to second and third degree burns of: (AIIMS 84)
 - a. 13%
 - b. 30%
 - c. 45%
 - d. 60%
16. Early surgery is indicated in: (PGI 86)
 - a. Amoebiasis peritonitis
 - b. Biliary peritonitis
 - c. Typhoid peritonitis
 - d. All
17. Most common cause of generalized peritonitis in a 40-year old adult male is: (AIIMS 92)
 - a. Enteric perforation
 - b. Ruptured liver abscess
 - c. Duodenal ulcer perforation
 - d. Perforated CA stomach

18. The commonest organism seen in peritonitis is: (TN 2001)
 a. Escherichia coli
 b. Clostridium welchii
 c. Staphylococci
 d. Klebsiella
19. Which of the following complications is not seen with peritonitis? (MAHE 2006)
 a. Renal failure
 b. Residual abscess
 c. Endotoxic shock
 d. Bone marrow suppression
20. A 25-years old female presents with pyrexia for ten days, develops acute pain in periumbilical region spreading all over the abdomen. What would be the most likely cause? (Recent Question 2014, UPSC 2007)
 a. Perforation peritonitis due to intestinal tuberculosis
 b. Generalized peritonitis due to appendicular perforation
 c. Typhoid enteric perforation and peritonitis
 d. Acute salpingo-oophoritis with peritonitis
21. Spontaneous peritonitis in cirrhosis patients; the polymorphonuclear cells are: (NEET 2013, UPPG 2008)
 a. More than 200 cells/cumm
 b. More than 300 cells/cumm
 c. More than 400 cells/cumm
 d. More than 500 cells/cumm
22. Which of following is true regarding classical spontaneous bacterial peritonitis? (NEET 2013, COMEDK 2010)
 a. Ascitic fluid neutrophil count is 250/cu.mm
 b. Bowel perforation should be present
 c. Multiple organisms are isolated from ascetic fluid
 d. Board-like rigidity is present in abdomen
23. A 10-years old female who used to use the swimming pool regularly, comes with a three day history of vomiting, fever and abdominal pain. On examination, abdominal tenderness and guarding are present. The liver dullness is not obliterated. Likely diagnosis is: (AIIMS 99)
 a. Gangrenous intussusceptions
 b. Perforation
 c. Spontaneous biliary peritonitis
 d. Primary peritonitis
24. Sonu, a 15-years old girl, a regular swimmer presents with sudden onset of pain in abdomen, abdominal distension and fever of 39°C and obliteration of the liver dullness. Most probable diagnosis is: (Recent Question 2014, AIIMS June 2001, Nov 99)
 a. Ruptured typhoid ulcer
 b. Primary bacterial peritonitis
 c. Ruptured ectopic pregnancy
 d. UTI with PID
25. All of the following regarding diagnosis of acute peritonitis are correct except: (MCI March 2007)
 a. Raised WBC count in peritoneal aspirate
 b. Moderately raised amylase levels are diagnostic of peritonitis
 c. CT scan may aid in diagnosis
 d. Upright films shows free air under the diaphragm
27. True about mesenteric cysts is: (PGI Dec 97)
 a. Enterogenous cyst is commonest type
 b. Recurrence is common after enucleation
 c. Mesenteric cyst are usually multiple
 d. Enucleation is the treatment of choice of chylolymphatic cyst
28. True about mesenteric cyst: (PGI Dec 2005)
 a. Moves perpendicular to the line of attachment
 b. Teratomatous is most common
 c. Chylolymphatic cyst has separate blood supply
 d. Surgical removal of bowel along cyst is treatment of choice in all the cyst
29. Mesenteric cyst whose removal entails removals of part of gut: (TN 95)
 a. Chylolymphatic cyst
 b. Enterogenous cyst
 c. Dermoid
 d. All
30. All are mesenteric cyst except: (DNB 2007)
 a. Dermoid cyst
 b. Chylolymphatic cyst
 c. Gartner's cyst
 d. Enterogenous cyst
31. A part of adjacent intestine will be removed in: (JIPMER 2012)
 a. Enterogenous
 b. Chylolymphatic cyst
 c. Dermoid cyst
 d. Mesothelial cyst

ASCITES

32. Transudative ascites is/are associated with: (PGI May 2011)
 a. Myxedema
 b. Budd Chiari syndrome
 c. Acute pancreatitis
 d. Portal vein thrombosis
 e. Congestive heart failure
33. Serum-ascites albumin gradient >1.1 g/dL is seen in:
 a. Nephrosis
 b. Cirrhosis (COMEDK 2005)
 c. Pancreatic ascites
 d. Neoplasm
34. Mucinous ascites is seen in: (PGI June 2000)
 a. Stomach CA
 b. TB
 c. Nephrotic syndrome
 d. Cirrhosis
35. The following are true regarding ascites except: (Kerala 2000)
 a. Only when the amount of fluid present exceeds 1500 ml. It can be recognized clinically
 b. Shifting dullness is absent when there is a very large accumulation of fluid
 c. In cirrhosis there is obstruction to the venous outflow of the liver due to obliterative fibrosis of the intra hepatic venous bed
 d. A transudate has a protein content of greater than 30 gms of protein per litre
 e. In Meig's syndrome it is associated with pleural effusion and solid fibroma of ovary
36. Pseudochylous ascites occurs in: (PGI 80, JIPMER 81)
 a. Cirrhosis
 b. Hyperlipidemia
 c. Filariasis
 d. Malignant ascites

PSEUDOMYXOMA PERITONEI

37. In pseudomyxoma peritonei, mucinous cyst-adenocarcinoma of which following organ is involved: (Orissa 2011)
 a. Pancreas
 b. Ovary
 c. Kidney
 d. Abdominal testis
38. Pseudomyxoma peritonei arises from: (PGI Dec 2008)
 a. Carcinoma ovary
 b. Ovarian cyst
 c. Ovarian dermoid
 d. Adenocarcinoma colon
 e. Mucocele of appendix

MESENTERIC CYST

26. Most common type of mesenteric cyst is? (MHSSMCET 2005)
 a. Enterogenous
 b. Chylolymphatic
 c. Urogenital
 d. Teratomatous

39. True about pseudomyxoma peritonei: (PGI June 2004)

- Seen in male only
- Cytoreductive surgery needed
- Always appendectomy needed
- Radiation therapy given
- Locally malignant tumor

40. Commonest site from where pseudomyxoma peritonei arise: (PGI June 2006)

- Ovary
- Appendix
- Pancreas
- Stomach
- Colon

41. All are true about pseudomyxoma peritonei except: (UPPG 2007)

- Common in male
- Associated with ovary tumors
- Yellow jelly collection of fluid
- Appendiceal adenocarcinoma

42. All are true about pseudomyxoma peritonei except: (DPG 2008)

- Associated with ovarian tumors
- Appendix is most common site of origin
- Yellow jelly collection of fluid
- Common in male

ABDOMINAL ABSCESS

43. Commonest site of intraperitoneal abscess is: (Orissa 2011)

- Lesser sac
- Greater sac
- Pelvis
- Paracolic gutter

44. The part of peritoneal cavity that is most dependent in supine position: (MHSSMCET 2009)

- Right subphrenic space
- Lesser sac
- Supra mesocolic space
- Right subhepatic space

45. Most common site of intra-abdominal abscess? (MHPPGMCET 2006)

- Pelvic
- Subphrenic space
- Mesenteric
- Paracolic gutters

46. Most common cause of infection and collection of fluid in the left subhepatic space: (MHPPGMCET 2009)

- Perforation at the lesser curvature of stomach
- Complicated acute pancreatitis
- Ruptured abscess of the left lobe of the liver
- Perforation of posterior duodenal wall ulcer

47. Posterior perforated ulcer on pyloric antrum cause abscess formation in: (PGI June 2009)

- Greater sac
- Lesser sac
- Pouch of Morrison
- Omental bursa
- Right subphrenic

48. In a patient recovering from peritonitis, which of the following would be the most characteristic sign of pelvic abscess? (MHPPGMCET 2008)

- Fever and abdominal pain
- Tachycardia
- Mucus in the stool for first time
- All of the above

49. Treatment of pouch of Douglas abscess is: (UPSC 87, 88)

- Laparotomy
- Posterior colpotomy
- Antibiotics
- Extraperitoneal drainage

50. Most common site for intra abdominal abscess following laparotomy is: (AIIMS 92)

- Sub hepatic
- Subphrenic
- Pelvic
- Paracolic

51. Correct about subphrenic abscess is: (PGI 81, DPG 86)

- Rarely chest symptoms
- Toxemia
- Rarely toxemia
- No sign and symptoms

52. The most favored treatment for a pelvic abscess in cul-de-sac is: (DPG 96)

- Laparotomy
- Colpotomy
- External I and D
- Antibiotics

53. Colopotomy is done to treat: (APPG 98)

- Ischeorectal abscess
- Pelvic abscess
- Appendicular abscess
- Perianal abscess

54. Most pathognomic in pelvic abscess is: (UPPG 2007)

- Constipation
- Mucopurulent discharge
- Loose stool
- Bleeding

55. Most common site of intraperitoneal abscess is: (DPG 2008)

- Right superior intraperitoneal space
- Right inferior intraperitoneal space
- Left superior intraperitoneal space
- Left superior intraperitoneal space

56. Most common site of intra peritoneal abscess? (APPG 2008)

- Morrison's pouch
- Omental bursa
- Pelvic region
- Left subhepatic pouch

57. A posteriorly perforating ulcer in the pyloric antrum of the stomach is likely to produce initial localized peritonitis or abscess formation in the: (AIIMS Nov 2004)

- Greater sac
- Left subhepatic and hepatorenal spaces (Pouch of Morrison)
- Right subphrenic space
- Lesser sac

58. A patient developed wound infection post laparotomy for pyoperitoneum, was treated conservatively. Now, granulation tissue is seen in the wound. Next step in managements is: (Recent Question 2015)

- Daily dressing
- Mesh repair
- Incision and drainage
- Re-suturing with interrupted stitches

PNEUMOPERITONEUM

59. Treatment of pneumoperitoneum, as a result of colonoscopic perforation in a young patient is: (PGI June 98)

- Temporary colostomy
- Closure + lavage
- Permanent colostomy
- Symptomatic

60. Best investigation for air in peritoneal cavity is: (CMC 98)

- USG
- Laparotomy
- Laparoscopy
- X-ray abdomen-erect view

61. In pneumoperitoneum following are seen except: (PGI 97)

- Hypertension
- Bradycardia
- Tachycardia
- Hypercapnia

62. In which one of the following conditions is gas under diaphragm not seen? (UPSC 2005)

- Perforated duodenal ulcer
- Typhoid perforation
- After laparotomy
- Spontaneous rupture of esophagus

63. Rigler's sign is seen in: (COMEDK 2008)

- Ulcerative colitis
- Crohn's disease
- Megacolon
- Pneumoperitonium

64. The best view to visualized minimal pneumo-peritoneum: (All India 2012)

- AP view abdomen
- Erect view abdomen
- Right lateral decubitus with horizontal beam
- Left lateral decubitus with horizontal beam

65. Advantage of carbon dioxide in laparoscopy are all except:

(Rohtak 97)

- a. Non-irritant
- b. Non-inflammable
- c. Minimally absorbed
- d. No tissue reaction
- e. None

PERITONEUM ANATOMY**66. True about boundaries of lesser sac:** (PGI 2000)

- a. Posteriorly stomach
- b. Crus of diaphragm
- c. Spleen
- d. Greater omentum

67. Lesser sac of stomach is bounded by: (PGI 2000)

- a. Posterior wall of stomach
- b. Visceral surface of spleen
- c. Under surface of liver
- d. Greater omentum

68. Lesser omentum has following contents except: (PGI 97)

- a. Hepatic vein
- b. Hepatic artery
- c. Portal vein
- d. Bile duct

69. True about relation of epiploic foramen is: (AIIMS 97)

- a. Portal vein posteriorly
- b. IVC inferiorly
- c. Hepatic art superiorly
- d. Bile duct anteriorly

70. Root of mesentery is crossed by: (AIIMS May 2011)

- a. Horizontal part of duodenum
- b. Left gonadal vessels
- c. Left ureter
- d. Superior mesenteric artery

WOUND DEHISCENCE**71. Burst abdomen most commonly occurs on the:**

(Recent Question 2014)

- a. 2nd day
- b. 3rd day
- c. 7th day
- d. 9th day
- e. 5th day

72. On 7th post operative day, abdominal wound shows pink serosanguinous discharge. It suggests: (DNB 2001)

- a. Impending wound dehiscence
- b. Infection in the abdomen
- c. Stitch abscess
- d. Healing wound

MESENTERIC LYMPHADENITIS**73. Acute mesenteric lymphadenitis is caused by:** (All India 94)

- a. E. coli
- b. α -hemolytic streptococci
- c. Hemophilus
- d. Yersinia

74. The commonest cause of acute mesenteric adenitis is:

(JIPMER 81, AMU 87)

- a. Tuberculosis
- b. Brucellosis
- c. Pneumococcal infection
- d. Idiopathic

75. Most common cause of acute mesenteric adenitis?

(MHSSMCET 2007)

- a. Yersenia enterocolytica
- b. M. tuberculosis
- c. Rotavirus
- d. Drugs

MISCELLANEOUS**76. Which of the following is not characteristic of visceral pain?**

- a. Poor localization
- b. Diffuse in nature (PGI 89)
- c. High threshold
- d. Very rapid adaptation

77. Odorless peritoneal fluid is noticed in: (AMC 81, APPG 89)

- a. Perforated peptic ulcer
- b. Perforated ileum
- c. Perforated appendix
- d. T.B. peritonitis

78. "Peritoneal mice" is: (Kerala PG 2015, APPG 97)

- a. Pseudomyxoma peritonei
- b. Appendices epiploicae
- c. Peritoneal seedings of tumour
- d. Endometriosis

79. Malignant change in lipoma is most common in: (Rohtak 2000)

- a. Thigh
- b. Nape of neck
- c. Retroperitoneum
- d. Back

80. Retractable mesenteris may be seen in: (NIMHANS 86)

- a. Ormond's disease
- b. Gardner's syndrome
- c. Turner's syndrome
- d. Down's syndrome

81. 'Gas' in the tissue should be differentiated with:

(UPPG 2007)

- a. Pseudomyxoma peritonei
- b. Pseudomonas infection
- c. Clostridium nouyi infection
- d. Non clostridial infection

82. The mesentery of small intestine, along its attachment to the posterior abdominal wall, crosses all of the following structures except: (AIIMS Nov 2004)

- a. Left gonadal vessels
- b. Third part of duodenum
- c. Aorta
- d. Right ureter

83. Which is the baseline investigation in the case of an acute abdomen in this high-tech era? (Kerala 2003)

- a. Abdomen CT
- b. Abdomen X-ray
- c. USG
- d. Colonoscopy

84. Which of the following abdominal structure will be responsible for sharp pain while doing abdominal surgery?

- a. Parietal peritoneum
- b. Liver parenchyma
- c. Small intestine
- d. Colon (AIIMS Nov 2000)

85. 'Peritoneal mice' come from: (MHPGME 2005)

- a. Appendices epiploicae
- b. Pseudomyxoma peritonei
- c. Metastases
- d. All

86. Median survival in malignant peritoneal mesothelioma:

(MHPGME 2005)

- a. 6-10 months
- b. 4-12 months
- c. 4-6 months
- d. 12-20 months

RETROPERITONEAL FIBROSIS

- ### RETROPERITONEAL FIBROSIS
- Uncommon inflammatory condition characterized by the **proliferation of fibrous tissue** in the **retroperitoneum**^Q
 - The fibrosis is usually confined to the **central and paravertebral spaces** between the **renal arteries and sacrum** and tends to **encase the aorta, IVC and ureters**^Q.
 - The process usually **begins at the level of the aortic bifurcation** and **spreads cephalad**^Q upto renal artery generally.
- #### Etiology
- Around 70% cases are **primary** or **idiopathic** (Ormond's disease)^Q
- | Causes of Secondary (30%) ^Q Retroperitoneal Fibrosis |
|---|
| <ul style="list-style-type: none">Inflammatory conditions: CATH^Q (Chronic pancreatitis, Actinomycosis, Tuberculosis, Histoplasmosis)Drugs: Methylsergide (Most important), methyldopa, hydralazine, entacapone, beta-blockers, bromocriptine, phenacetin, amphetamines^Q (MAHE-BP)Malignancies: CA prostate, NHL, CA stomach, sarcoma and carcinoid tumorAutoimmune disorders: SLE, PAN and ankylosing spondylitisRadiation |
- #### Clinical Features
- More common in **males** of 40-60 years^Q.
 - Early symptoms** are **vague and non-specific**^Q (**abdominal or flank pain**, weight loss, malaise, and hypertension)
 - Obstructive uropathy** (dysuria, frequency, fever due to secondary infection of hydronephrotic kidney) is the **earliest** and **MC specific symptom**^Q.
- | |
|--|
| <ul style="list-style-type: none">Ureters are MC involved, MC site is lower third of ureter.Partial or complete obstruction occurs in 75% patients^Q. |
|--|
- #### Diagnosis:
- In absence of uremia, diagnosis is made by IVP.
- IVP or RGP:**
 - Hydronephrosis with dilated tortuous upper ureter,
 - Medial pulling of ureters** or **pipestem ureters**^Q
 - Extrinsic ureteral compression**^Q
 - CT scan** is **IOC** for retroperitoneal fibrosis^Q.
 - MRI** is **IOC** in cases of **compromised renal function**, because contrast cannot be given.
- #### Treatment
- Primary, idiopathic** retroperitoneal fibrosis: **Ureteral stenting** and **immunosuppression** (TAPS: Tamoxifen, Azathioprine, Penicillamine, Steroids)^Q
 - Secondary retroperitoneal fibrosis:** **Midline transperitoneal ureterolysis** with wrapping the ureter with **omental flap** or **lateral retroperitoneal ureteral transposition**^Q.
- | |
|---|
| TAPS: Tamoxifen, Azathioprine, Penicillamine, Steroids are used in primary retroperitoneal fibrosis ^Q . |
|---|

- ## PERITONITIS

- ## SPONTANEOUS BACTERIAL PERITONITIS

- **SBP** is a common and severe complication of ascites characterized by **spontaneous infection of the ascitic fluid without an intra-abdominal source**^Q

- Prevalence of SBP is 10–30%^Q in patients of ascites, with 20% in-hospital mortality rate^Q.

- MC organism in adults: *E. coli*^Q > *Klebsiella*.
- MC organism in children: Group A streptococci^Q

Mechanism

- Bacterial translocation with gut flora traversing the intestine into mesenteric lymph nodes, leading to bacteremia and seeding of the ascitic fluid^Q.
- Predisposing Factors: Bowel preparation, metabolic alkalosis, dehydration and hypoproteinemia^Q
- It seen more commonly in patients presenting with GI hemorrhage^Q.

Clinical Features

- Patients with ascites may present with fever, altered mental status, elevated WBC count^Q, and abdominal pain or discomfort, or they may present without any of these features.
- High degree of clinical suspicion and peritoneal taps are important for making the diagnosis.

Diagnosis

- The presence of >250^Q polymorphonuclear cells of ascitic fluid is consistent with SBP; with ascitic fluid culture growing single organism.
- If more than two organisms are identified, secondary bacterial peritonitis due to a perforated viscus should be considered^Q.

- Culture negative neutrocytic ascites is diagnosed, when an ascitic fluid PMN count of >250 is unaccompanied by a positive ascitic fluid culture^Q.
- Culture negative neutrocytic ascites carries a similar prognosis^Q to SBP and is managed similarly.

Treatment

- Treated with cefotaxime plus albumin^Q
- Norfloxacin decreases the incidence of SBP^Q in patients with variceal bleeding; patients with low-protein ascites and patients with a prior history of SBP.
- Repeat diagnostic paracentesis is indicated after 48 hours of appropriate antibiotic therapy only if there is a lack of clinical improvement or in cases of secondary bacterial peritonitis^Q.

Prognosis

- Occurrence of SBP is an important landmark in natural history of cirrhosis with 1 and 2 year survival rate of 30% and 20%, respectively^Q.
- Mortality rate of >20%^Q is seen in SBP despite of hospital treatment.

6. Ans. b. More common in females

7. Ans. a. Volvulus, b. Obstructed hernia, c. Appendicular perforation with paralytic ileus, d. Toxic megacolon, e. Colonic perforation (Ref: Sabiston 19/e p1242-1243; Schwartz 9/e p990)

Indications of Immediate Surgery in Intestinal Obstruction	
<ul style="list-style-type: none"> • Obstructed or strangulated hernia^Q • Operative decompression^Q needed (in Toxic megacolon) 	<ul style="list-style-type: none"> • Volvulus^Q of gut • Acute obstruction^Q • Colonic perforation^Q

8. Ans. a. USG, b. Multidetector CT, c. Contrast enhanced CT, d. X-ray (Ref: Sabiston 19/e p1148-1150; Schwartz 9/e p989-990)

INVESTIGATIONS IN ACUTE ABDOMEN

- Plain X-ray: Important role in imaging of patients with acute abdominal pain (useful for intestinal obstruction and perforation)^Q.
- USG: Extremely accurate in detecting gallstones and GB pathology^Q
- CECT and MDCT: Improvement in imaging techniques, especially MDCT has revolutionized the diagnosis of acute abdomen^Q.

9. Ans. c. Total parenteral nutrition (Ref: Schackelford 7/e p930, 944)

This is a case of duodenal stump blowout. Best treatment is adequate drainage immediately by putting a catheter through an incision below the right costal margin^Q. TPN should be instituted and attention should be directed towards fluid and electrolyte therapy^Q.

Since drainage by putting a catheter through an incision below the right costal margin^Q option is not there, best option will be TPN.

DUODENAL STUMP BLOWOUT

- Duodenal stump blowout is massive leakage from duodenal stump following Billroth-II gastrectomy^Q.

Clinical Features

- It usually occurs on **4th to 7th** post-operative day^Q.
- Usually presents as **sudden intense thoracoabdominal pain**, **sudden elevation in pulse** and **temperature** or **generalized deterioration** of condition.

Treatment

- **Adequate drainage** must be instituted **immediately**, which is done by putting a **catheter** through an incision **below the right costal margin**^Q.
- **TPN** should be instituted and attention should be directed towards **fluid and electrolyte therapy**^Q.
- **Fistula closure** can be anticipated **within 2–3 weeks**^Q.

10. Ans. a. Perforated Meckel's diverticulum, b. Uterine rupture following illegal abortion, c. Perforation of duodenal ulcer, e. Appendicular perforation (Ref: Chapman 4/e p212)

Causes of Pneumoperitoneum	
1. Perforation of GI Tract: <ul style="list-style-type: none"> • Peptic ulcer^Q • Inflammation (Diverticulitis, appendicitis, toxic megacolon, necrotizing enterocolitis)^Q • Infarction • Malignant neoplasm • Pneumatosis cystoides rupture^Q • Iatrogenic (Endoscopy)^Q 	3. Iatrogenic: <ul style="list-style-type: none"> • Surgery, peritoneal dialysis, • Drainage catheter, biopsy
2. Penetrating abdominal injury ^Q	4. Through female genital tract: <ul style="list-style-type: none"> • Spontaneous • Iatrogenic (perforation, culdocentesis, tubal patency test)^Q
	5. Gas forming peritonitis ^Q
	6. Pneumothorax with pleuroperitoneal fistula

11. Ans. b. Blood (Ref: Harrison 18/e p2519)

- Gastric juice, pancreatic juice, bile, urine and meconium irritate peritoneal cavity and lead to aseptic or chemical peritonitis^Q.
- Chemical irritation of the peritoneum is greatest for acidic gastric juice and pancreatic enzymes^Q.

12. Ans. a. Duodenal ulcer perforation (Ref: <http://emedicine.medscape.com/article/372053-overview>; Sabiston 19/e p1100, 1142)

MC cause of peritonitis in adult male: Peptic ulcer perforation

PERITONITIS

- The **most common cause** is a **perforation of the abdominal viscus—most commonly, a perforated ulcer**^Q, may occur as a result of perforation of any part of the bowel; other causes include a benign ulcer, a tumor, or trauma.
- MC cause of peritonitis in adult male: **Peptic ulcer perforation**^Q

13. Ans. a. Bacteroides (Ref: Sabiston 19/e p1100–1102; Bailey 26/e p971–973, 25/e p992–993)

SECONDARY (ACUTE SUPPURATIVE) BACTERIAL PERITONITIS

- When **bacteria contaminate** the peritoneum as a **result of spillage** from an intra-abdominal viscus^Q.
- Infection in secondary bacterial peritonitis is **polymicrobial**^Q
- **E. coli** and **Bacteroides** are **MC organisms**^Q.
- The species of organism isolated vary with the source of the initial process and the normal flora present at the site.

PERITONITIS ASSOCIATED WITH CHRONIC AMBULATORY PERITONEAL DIALYSIS (CAPD)

- Peritonitis is **one of the MC complications** of CAPD^Q, occurring with an incidence of approximately **one episode every 1 to 3 years**^Q.
- Refractory or recurrent peritonitis is MC cause of technical failure of CAPD^Q.

- MC organism: **Staphylococcus epidermidis**^Q (30–50%).

Clinical Features

- Patients present with **abdominal pain**, **fever**, and **cloudy peritoneal dialysate** containing **>100 WBC/mm³**, with **>50%** of the cells being **neutrophils**^Q.
- Gram staining detects organisms only in **10–40%** of cases^Q.

Treatment

- CAPD associated peritonitis is treated by the **intraperitoneal administration of antibiotics**, usually a **first-generation cephalosporin**^Q.
- Overall, 75% of infections are **cured by culture-directed antibiotic therapy**^Q.
- **Recurrent or persistent peritonitis** requires **removal of the dialysis catheter** and resumption of **hemodialysis**^Q.

14. Ans. b. Nephrotic syndrome (Ref: Bailey 26/e p975, 25/e p999)

PNEUMOCOCCAL PERITONITIS

- **Primary pneumococcal peritonitis** may **complicate nephrotic syndrome** or **cirrhosis in children**^Q.
- Otherwise **healthy children**, particularly **girls between 3–9 years of age**, may also be affected, and it is likely that the **route of infection** is sometimes **via the vagina and fallopian tubes**^Q.
- At other times, and **always in males**, the **infection is blood-borne** and **secondary to respiratory tract or middle ear disease**^Q.

Clinical Features

- **Onset is sudden**, **earliest symptom** is **pain localized to the lower half of the abdomen**.
- **Temperature** is raised to **39°C or more** and there is usually **frequent vomiting**^Q.
- **After 24–48 hours**, **profuse diarrhea** is **characteristic** and **increased frequency of micturition** (caused by **severe pelvic peritonitis**)^Q
- On examination, **abdominal rigidity** is usually **bilateral** but is **less than in most cases of acute appendicitis with peritonitis**^Q

Diagnosis

- **WBC count** $\geq 30\,000/\mu\text{L}$ with approximately **90% polymorphs** suggests **pneumococcal peritonitis** rather than **appendicitis**^Q.

Treatment

- **Antibiotic therapy** + **Correcting dehydration and electrolyte imbalance** + **Early surgery**^Q
- **Laparotomy or laparoscopy** may be used.

- If the exudate be odourless and sticky, the **diagnosis of pneumococcal peritonitis** is **practically certain**^Q

15. Ans. c. 45%

16. Ans. b. Biliary peritonitis, c. Typhoid peritonitis

17. Ans. c. Duodenal ulcer perforation

18. Ans. a. Escherichia coli

19. Ans. None or d. Bone marrow suppression (Ref: Bailey 26/e p975, 25/e p995)

Complications of Peritonitis	
Abdominal Complications	Systemic Complications
<ul style="list-style-type: none"> • Adhesive small bowel obstruction^Q • Paralytic ileus^Q • Residual or recurrent abscess^Q • Portal pyemia (liver abscess)^Q 	<ul style="list-style-type: none"> • Bacteraemic/endotoxic shock^Q • Bronchopneumonia/respiratory failure^Q • Renal failure^Q • Bone marrow suppression^Q • Multisystem failure

20. Ans. c. Typhoid enteric perforation and peritonitis (Ref: Sabiston 19/e p1254; Schwartz 9/e p1007; Bailey 26/e p91, 25/e p1174; Harrison 18/e p1276)

ENTERIC FEVER OR TYPHOID

- Enteric fever is a potentially life-threatening systemic disease characterized by **fever and abdominal pain**^Q
- It is caused by **Salmonella typhi** or **paratyphi**^Q
- **Typhoid** is the **MC cause of ileal perforation** in **tropical countries (India)**^Q.

Pathology

- **Ulceration and necrosis of ileocecal Peyer's patches**^Q
- The **ulcer** is **parallel to the long axis of the gut** and is usually situated in the **lower ileum (longitudinal ulcers)**^Q
- **Perforation of a typhoid ulcer** usually occurs during the **third week**^Q and is occasionally the first sign of the disease.

Clinical Features

- **Fever and abdominal pain** are **hallmark symptoms**^Q
- Non-specific symptoms: **Headache, cough, sweating, myalgia, arthralgia, fatigue**
- **Paralytic ileus** is the **MC complication**^Q of typhoid.
- **Intestinal hemorrhage (2nd MC)**^Q may be the leading symptom.

Complications of Enteric Fever	
<ul style="list-style-type: none"> • Paralytic ileus (MC)^Q • Intestinal hemorrhage (2nd MC)^Q • Perforation^Q • Cholecystitis^Q 	<ul style="list-style-type: none"> • Phlebitis • Genitourinary inflammation • Arthritis • Osteomyelitis

Characteristic Signs

- Rose spots, splenomegaly, leucopenia with shift to left^Q
- Lipopolysaccharide endotoxin is responsible for leucopenia and splenomegaly^Q
- Relative bradycardia despite of high fever^Q

21. Ans. a. More than 200 cells/cumm

22. Ans. a. Ascitic fluid neutrophil count is 250/cu.mm

23. Ans. d. Primary peritonitis (Ref: Sabiston 19/e p1146; Bailey 26/e p975, 25/e p993-994)

Primary (Pneumococcal) peritonitis	• Liver dullness is not obliterated ^Q
Perforation (Secondary) peritonitis	• Liver dullness is obliterated ^Q

LIVER DULLNESS

- Right mid-axillary line is percussed from above downwards. The percussion note will be resonant in the upper part of the mid-axillary line. At the **upper border of the liver**, the **resonant note is replaced by dull note**.
- If the **liver dullness is replaced by a resonant note**, it indicates **presence of free gas under diaphragm** as occurs in the **perforation of gastrointestinal tract**^Q.

24. Ans. a. Ruptured typhoid ulcer

25. Ans. b. Moderately raised amylase levels are diagnostic of peritonitis

MESENTERIC CYST

26. Ans. b. Chylolymphatic (Ref: Sabiston 19/e p1104-1105; Schwartz 10/e p1459-1460, 9/e p1277; Bailey 26/e p983-984; Schackelford 7/e p1699)

MESENTERIC CYST

- Mesenteric cyst is encountered **most frequently** in the **2nd decade of life**
- More common in **women**

Types of Mesenteric cysts	
<ul style="list-style-type: none"> • Chylolymphatic (MC)^Q • Simple (mesothelial) • Enterogenous 	<ul style="list-style-type: none"> • Urogenital remnant • Dermoid (teratomatous cyst)

Chylolymphatic Cyst	Enterogenous Cyst
<ul style="list-style-type: none"> • MC type, arises in congenitally misplaced lymphatic tissue that has no efferent communication with the lymphatic system^Q • Arises most frequently in the mesentery of the ileum^Q. • Thin wall of the cyst, filled with clear lymph or chyle. • Occasionally, the cyst attains a great size. • Mostly unilocular and solitary^Q • Chylolymphatic cyst blood supply is independent from that of the adjacent intestine^Q • Enucleation is possible without the need for resection of gut^Q. 	<ul style="list-style-type: none"> • Derived either from a diverticulum of the mesenteric border of the intestine or from a duplication of the intestine^Q. • Thicker wall than a chylolymphatic cyst and it is lined by mucous membrane, sometimes ciliated^Q. • Content is mucinous and is either colorless or yellowish brown as a result of past hemorrhage. • Muscle in the wall of an enteric duplication cyst and adjacent bowel has a common blood supply^Q • Removal of the cyst always entails resection of the related portion of intestine^Q.

Clinical Features

- A **painless abdominal swelling**^Q
- **Recurrent attacks of abdominal pain**^Q with or without vomiting (temporary impaction of a food bolus in a segment of bowel narrowed by the cyst or possibly from torsion of the mesentery)
- **Acute abdominal pain** may arise as a result of: **Torsion, rupture, hemorrhage, infection**.

- **Tillaux triad**: **Fluctuant swelling** near the **umbilicus** + **moves freely** in a plane perpendicular to the attachment of the **mesentery** + **zone of resonance** around the cyst^Q.

Diagnosis

- CT scan: Investigation of choice for diagnosis of mesenteric cyst^Q
- USG: Helpful in diagnosis

Treatment

- Chylolymphatic cysts: Enucleation is treatment of choice^Q
- Enterogenous cyst: Resection and anastomosis is the treatment of choice^Q
- Aspiration alone has a high rate of cyst recurrence^Q.

27. Ans. d. Enucleation is the treatment of choice of chylolymphatic cyst
28. Ans. a. Moves perpendicular to the line of attachment, c. Chylolymphatic cyst has separate blood supply
29. Ans. b. Enterogenous cyst
30. Ans. c. Gartner's cyst
31. Ans. a. Enterogenous cyst

ASCITES

32. Ans. a. Myxedema, b. Budd Chiari syndrome, d. Portal vein thrombosis, e. Congestive heart failure (Ref: Sabiston 19/e p1100)

Classification of Ascites by Serum-Ascites Albumin gradient	
High Gradient (>1.1 g/dL) or Transudate	Low Gradient (<1.1 g/dL) or Exudate
<ul style="list-style-type: none"> • Cirrhosis (MC)^Q • Alcoholic hepatitis^Q • Cardiac ascites^Q • Mixed ascites • Massive liver metastases • Fulminant hepatic failure^Q • Budd-Chiari syndrome^Q • Portal vein thrombosis^Q • Sinusoidal obstruction syndrome • Myxedema^Q • Fatty liver of pregnancy 	<ul style="list-style-type: none"> • Peritoneal carcinomatosis (MC)^Q • Tubercular peritonitis^Q • Pancreatic ascites • Bowel obstruction or infarction^Q • Biliary ascites • Nephrotic syndrome^Q • Post-operative lymphatic leak • Serositis in connective tissue disease

- MC cause of low-albumin gradient ascites: Peritoneal carcinomatosis^Q
- MC cause of high-albumin gradient ascites: Cirrhosis^Q

33. Ans. b. Cirrhosis
34. Ans. a. Stomach CA (Ref: Harrison 16th/245)

CAUSES OF MUCINOUS ASCITES

- Pseudomyxoma peritonei^Q
- Colloid carcinoma of stomach^Q or colon^Q with peritoneal implants

35. Ans. a. Only when the amount of fluid present exceeds 1500 ml. It can be recognized clinically, d. A transudate has a protein content of greater than 30 gms of protein per litre (Ref: Bailey 26/e p979, 25/e p1001)

CLINICAL FEATURES OF ASCITES

- Ascites can be recognized clinically when the amount of fluid exceeds 150 ml^Q.
- Abdomen is distended evenly with fullness of the flanks, which are dull to percussion.
- Usually, shifting dullness is present^Q but when there is a very large accumulation of fluid this sign is absent^Q. In such cases, on flicking the abdominal wall, a characteristic fluid thrill is transmitted from one side to the other.
- In cirrhosis, there is obstruction to the portal venous system, which is caused by obliterative fibrosis of the intrahepatic venous bed^Q. Lymph flow may be increased.
- Meig's syndrome: Ascites and pleural effusion are associated with solid fibroma of the ovary^Q. The effusion disappears when the tumour is excised.

36. Ans. d. Malignant ascites (Ref: www.ncbi.nlm.nih.gov > *Proc R Soc Med* > v.6(Med Sect; 1913; Bailey 26/e p980, 25/e p1002)

PSEUDOCHYLOUS ASCITES

- **Abnormal accumulation** in the peritoneal cavity of a **milky fluid that resembles chyle**.
- The **turbidity of the fluid** is **caused by cellular debris** in the fluid^Q.
- Pseudochylous ascites is **indicative of an abdominal tumor or infection**^Q.

CHYLOUS ASCITES

- In some patients the **ascitic fluid appears milky** because of an **excess of chylomicrons (triglycerides)**^Q.

Causes of Chylous Ascites

<ul style="list-style-type: none"> • Malignancy (Lymphomas-MC)^Q • Cirrhosis^Q • Tuberculosis • Filariasis^Q • Nephrotic syndrome^Q • Sarcoidosis 	<ul style="list-style-type: none"> • Abdominal trauma (including surgery) • Constrictive pericarditis • Congenital lymphatic abnormality^Q
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- The **prognosis is poor** unless the underlying condition can be cured.
- In addition to other measures used to treat ascites, patients should be placed on a **fat-free diet** with **medium-chain triglyceride**^Q supplements.

PSEUDOMYXOMA PERITONEI

37. Ans. b. Ovary (Ref: *Sabiston 19/e p1102-1103; Schwartz 10/e p1258-1259, 9/e p1088-1089; Bailey 26/e p980-981, 25/e p1003*)

PSEUDOMYXOMA PERITONEI

- Pseudomyxoma peritonei describes **mucinous ascites** arising from a **ruptured appendiceal or ovarian adenocarcinoma**^Q.
- **MC site of primary: Appendix**^Q
- **Peritoneum** becomes **coated with a mucus-secreting tumor** that **fills the peritoneal cavity** with **tenacious semisolid mucus** and **large, loculated cystic masses**^Q.
- Occurs **most commonly** in **40–50 years** of age
- Occurs with **equal frequency** in **men and women**^Q.

Clinical Features

- Patients are **often asymptomatic**^Q until late in the course of their disease.
- **On presentation, global deterioration in health** long before the diagnosis is made
- **Abdominal pain** and **distention** and **nonspecific complaints** are common.
- **Physical examination:** A new **hernia, ascites, distended abdomen** with **nonshifting dullness**^Q and, occasionally, a palpable abdominal mass.

Diagnosis

- **CT (chest, abdomen and pelvis):** Information regarding the **diagnosis** and the **ability to resect the tumor completely** or **perform an adequate cytoreduction**^Q.
- **Preoperative colonoscopy:** Differentiate a **mucinous neoplasm of the appendix** from that **arising from the colon**^Q.
- Often, the **diagnosis is made at laparotomy** (peritoneal cavity containing **tenacious semisolid mucus** and **large, loculated cystic masses**)

Treatment

- **Cytoreduction** (Resection of as much of the tumor as possible) + **Intraperitoneal hyperthermic chemotherapy (IPHC)**^Q.

- **Operative management:** Omentectomy, stripping of involved peritoneum, resection of involved organs and appendectomy with right hemicolectomy^Q

Prognosis

- **Adenomucinosis** (Adenocarcinoma of appendix): **Best survival rate** (75% at 5 years)
- **Peritoneal mucinous carcinomatosis:** **Worst** (14% at 5 years)

38. Ans. a. Carcinoma ovary, d. Adenocarcinoma colon, e. Mucocele of appendix (Ref: *Recent Advances in Surgery*, Irving Taylor/83)

- "In addition to the association of PMP with appendiceal and ovarian tumors, there are cases reports suggesting occasional origin from other intra-abdominal organs such as the colon, rectum, stomach, GB, bile duct, small intestine, urinary bladder, lung, breast fallopian tube and pancreas. With the exception of colorectal mucinous adenocarcinoma, which often simulate PMP, these are rare and only account for less than 5% of total cases."

39. Ans. b. Cytoreductive surgery needed, c. Always appendectomy needed, e. Locally malignant tumor

40. Ans. b. Appendix

41. Ans. a. Common in male

42. Ans. d. Common in male

ABDOMINAL ABSCESS

43. Ans. c. Pelvis (Ref: *Maingot 11/e p179-184; Bailey 26/e p977-978, 25/e p996-997*)

INTRA-ABDOMINAL ABSCESS

- MC site of intra-peritoneal abscess: Pelvis^Q
- Right subhepatic space (lies between inferior surface of liver and hepatic flexure and transverse mesocolon) is the most dependent portion of the abdominal cavity in the recumbent position^Q.
- Pelvic cavity is the most dependent area of the peritoneal cavity in the upright position^Q.

Clinical Features

- High spiking fevers, chills, abdominal pain, anorexia, and delay of return of bowel function^Q in the postoperative patient are typical presenting signs and symptoms of intraperitoneal abscess.

Diagnosis

- CT scan: Investigation of choice for diagnosis of intra-abdominal abscess^Q

Treatment

- Preferred treatment: CT guided percutaneous drainage^Q
- Operative drainage: If percutaneous drainage is not possible or contraindicated

44. Ans. d. Right subhepatic space

45. Ans. a. Pelvic

46. Ans. b. Complicated acute pancreatitis (Ref: *Bailey 25/e p997*)

LEFT SUBHEPATIC SPACE (LESSER SAC)

- The commonest cause of infection here is complicated acute pancreatitis^Q.
- In practice, a perforated gastric ulcer rarely causes a collection here because the potential space is obliterated by adhesions.

47. Ans. b. Lesser sac, d. Omental bursa (Ref: *Bailey 26/e p978, 25/e p1062; Schwartz 9/e p921*)

- Gastric ulcers perforate into the lesser sac, which can be particularly difficult to diagnose^Q.
- A gastric ulcer perforates into the lesser sac^Q, then no generalized peritonitis can be seen but misleading symptoms may appear.

48. Ans. d. All of the above (Ref: *Bailey 26/e p977, 25/e p996*)

PELVIC ABSCESS

- Pelvis is the commonest site of an intraperitoneal abscess because the vermiform appendix is often pelvic in position and the fallopian tubes are frequent sites of infection^Q.
- A pelvic abscess can also occur as a sequel to any case of diffuse peritonitis and is common after anastomotic leakage^Q following colorectal surgery

Clinical Features

- The most characteristic symptoms are diarrhea and passage of mucus in the stools.^Q
- Rectal examination reveals a bulging of the anterior rectal wall^Q, which, when the abscess is ripe, becomes softly cystic.
- Left to nature, a proportion of these abscesses burst into the rectum, after which the patient nearly always recovers rapidly. If this does not occur, the abscess should be drained deliberately.

Diagnosis

- If any uncertainty exists, the presence of pus should be confirmed by ultrasound or CT scanning with needle aspiration if indicated^Q.

Treatment

- In women, vaginal drainage through the posterior fornix (Posterior colpotomy) is often chosen^Q.
- In other cases, when the abscess is definitely pointing into the rectum, rectal drainage is employed^Q.
- Laparotomy is almost never necessary^Q.
- Rectal drainage of a pelvic abscess is far preferable to suprapubic drainage, which risks exposing the general peritoneal cavity to infection^Q.
- Drainage tubes can also be inserted percutaneously or via the vagina or rectum under ultrasound or CT guidance^Q.

49. Ans. b. Posterior colpotomy
 50. Ans. c. Pelvic
 51. Ans. b. Toxemia
 52. Ans. b. Colpotomy
 53. Ans. b. Pelvic abscess
 54. Ans. b. Mucopurulent discharge
 55. Ans. b. Right inferior intraperitoneal space (Ref: Bailey 25/e p996)

Most common site of intra-peritoneal abscess is pelvis. Best option among the options provided is **inferior space**, right inferior intra-peritoneal space.

56. Ans. c. Pelvic region
 57. Ans. d. Lesser sac
 58. Ans. d. Re-suturing with interrupted stitches

PNEUMOPERITONEUM

59. Ans. b. Closure + lavage (Ref: Schackelford 7/e p1747-1748; Harrison 18/e p2409; Schwartz 10/e p1180, 9/e p1069)

RISKS ASSOCIATED WITH COLONOSCOPY

- Risks of colonoscopy: Perforation and hemorrhage^Q
 - MC site of bleeding after colonoscopy: Stalk after polypectomy.
 - MC site of perforation during colonoscopy: Sigmoid colon^Q
- Perforation can be caused by excessive air pressure, tearing of the antimesenteric border of the colon from excessive pressure on colonic loops, and at the sites of electrosurgical applications^Q

Management

- Patients with perforation but no peritoneal signs can be safely managed with careful monitoring (Bowel rest + Broad spectrum antibiotics + Close observation^Q)
- A large perforation recognized during the procedure requires surgical exploration. Because the bowel has almost always been prepared prior to the colonoscopy, there is usually little contamination associated with these injuries and most can be repaired primarily^Q.

60. Ans. d. X-ray abdomen-erect view (Ref: Bailey 26/e p973, 25/e p994)

- Bailey says "A radiograph of the abdomen may confirm the presence of dilated gas-filled loops of bowel (consistent with a paralytic ileus) or show free gas, although the latter is best shown on an erect chest radiograph. If the patient is too ill for an 'erect' film to demonstrate free air under the diaphragm, a lateral decubitus film is just as useful, showing gas beneath the abdominal wall."

61. Ans. b. Bradycardia
 62. Ans. d. Spontaneous rupture of esophagus
 63. Ans. d. Pneumoperitoneum (Ref: Sabiston 19/e p1148-1149; Bailey 26/e p190, 25/e p147)

PNEUMOPERITONEUM

- Best projection to demonstrate pneumoperitoneum: Chest X-ray^Q
- If the patient cannot get into an erect position then left lateral decubitus projection is required^Q.
- Patient should be in that position for 10 min^Q at least for air to rise up.
- By careful technique even 1 ml of air can be detected

Supine Film Signs of Pneumoperitoneum	
Football sign	Collection of air in the centre of abdomen over a fluid collection ^Q
Rigler's sign	Visualization of both aspects of bowel wall being outlined by air on either side ^Q
Cupola sign	Large amount of gas under the diaphragm ^Q
Triangle sign	Air between bowel loop ^Q

- Chilladiti syndrome or interposition of colon between liver and diaphragm can mimic pneumoperitoneum^Q

64. Ans. d. Left lateral decubitus with horizontal beam
 65. Ans. c. Minimally absorbed

- Carbon dioxide has the advantage of being noncombustible and rapidly absorbed from the peritoneal cavity; however, it may lead to hypercarbia in patients with significant cardiopulmonary disease^Q.

PERITONEUM ANATOMY

66. Ans. d. Greater omentum (Ref: BDC 4/e pvol II/232, 240)

LESSER SAC (OMENTAL BURSA)

- A large recess of peritoneal cavity behind stomach, lesser omentum and caudate lobe of liver, which separates stomach bed from stomach.
- It is closed all around except in upper part of its right border where it communicates with the greater sac through the epiploic foramen^Q.
- Level of epiploic foramen: T12 vertebra^Q

Boundaries of Lesser Sac	
Anterior	Posterior
<ul style="list-style-type: none"> Caudate lobe of liver^Q Stomach^Q Lesser omentum^Q Greater omentum^Q (anterior 2 layers) 	<ul style="list-style-type: none"> Greater omentum^Q (posterior 2 layers) Structures forming stomach bed: <ul style="list-style-type: none"> Diaphragm^Q – Left kidney and suprarenal gland Pancreas^Q – Transverse mesocolon^Q Splenic flexure of colon – Splenic artery^Q Spleen (sometimes)

67. Ans. a. Posterior wall of stomach, d. Greater omentum

68. Ans. a. Hepatic vein

69. Ans. d. Bile duct anteriorly

70. Ans. a. Horizontal part of duodenum (Ref: BDC 4/e pvol II/227)

MESENTERY

- Mesentery is a fan shaped fold of peritoneum that attaches the jejunum and ileum to posterior abdominal wall^Q.
- Root of mesentery is 15 cm long^Q.
- It is directed obliquely downwards and to the right, extending from:
 - Duodenojejunal flexure on the left side of L2 vertebra^Q
 - Upper part of right sacroiliac joint^Q

Root of Mesentery Crosses Following Structures in Order	
1. 4th (ascending) and 3 rd (horizontal) part of duodenum ^Q	4. Right ureter ^Q
2. Abdominal aorta ^Q	5. Right psoas major ^Q
3. IVC ^Q	6. Right testicular or ovarian vessels ^Q

WOUND DEHISCENCE

71. Ans. c. 7th day (Ref: CSDT 11/e p24; Bailey 26/e p279-280, 25/e p986)

WOUND DEHISCENCE (BURST ABDOMEN)

- Serous or serosanguinous discharge from the wound is the first sign^Q of dehiscence
 - Most commonly observed between 6th and 8th post-operative day^Q (may occur at any time following wound closure)
- Wound dehiscence is partial or total disruption of any or all layers of the operative wound.
- Extrusion of abdominal viscera after rupture of all layers is known as evisceration^Q.

Predisposing Factors for Wound Dehiscence	
Local Risk Factors	Systemic Risk Factors
<ul style="list-style-type: none"> Inadequate closure (Most important)^Q Increased intra-abdominal pressure Deficient wound healing due to: <ul style="list-style-type: none"> Infections^Q Hematoma^Q Seroma^Q Presence of drain^Q 	<ul style="list-style-type: none"> Old age^Q Obesity^Q Immunosuppression^Q Systemic diseases: <ul style="list-style-type: none"> Diabetes^Q Jaundice, Sepsis^Q Uremia^Q Cancer^Q

Management

- Wound dehiscence without evisceration: Prompt elective closure^Q of the wound
- Wound dehiscence with evisceration:
 - Wound is covered with moist towels
 - Under GA, any exposed bowel or omentum is rinsed with RL containing antibiotics and then returned to abdomen
 - Previous sutures are removed, wound is reclosed (Tension suturing^Q)

72. Ans. a. Impending wound dehiscence

MESENTERIC LYMPHADENITIS

73. Ans. d. Yersinia (Ref: Sabiston 19/e p1105; Bailey 26/e p982, 25/e p1004)

ACUTE MESENTERIC LYMPHADENITIS

- Syndrome of **acute right lower quadrant abdominal pain** associated with **mesenteric lymph node enlargement** and a **normal appendix**^Q.
- **Diagnosis is made upon exploration** of the abdomen of a **patient suspected of having acute appendicitis** at which time a **normal appendix and enlarged mesenteric lymph nodes**^Q are discovered.
- Occurs **most commonly in children and young adults**^Q
- Equal frequency in males and females.
- **Etiology often remains unknown**, although **some cases** are associated with **Yersinia infection of the ileum**.
- **Yersinia enterocolitica** has been associated with this syndrome in **children**^Q.

74. Ans. d. Idiopathic

75. Ans. a. Yersinia enterocolitica

PERITONEUM (IMPORTANT POINTS)

- Largest cavity in the body: **Peritoneal cavity**^Q
- Least sensitive peritoneum: **Pelvic peritoneum**^Q
- Most sensitive peritoneum: **Parietal (anterior) peritoneum**^Q
- Healing in parietal peritoneum: **Metamorphosis of mesenchymal cells**^Q
- **Duodenal perforation is usually sterile while intestinal perforation is usually infected**^Q.
- **Periodic peritonitis do not require laparotomy, treatment is colchicine**^Q.
- **Shifting tenderness is sign of mesenteric lymphadenitis**^Q
- **Brucellosis is also known as disease of mistake**^Q.
- **MC solid tumor of omentum: Metastatic carcinoma**^Q

MISCELLANEOUS

76. Ans. d. Very rapid adaptation (Ref: Guyton 11th/603-604; Ganong 23/e p169-170)

CHARACTERISTIC FEATURES VISCERAL PAIN

- Visceral pain is **poorly localized**, often the pain is **referred** or **radiating**^Q
- Pain of hollow viscus is often **felt as a colic**^Q (it comes and goes to reappear again).
- **Highly localized types of damage to the viscera seldom cause severe pain**
- Often accompanied by **vomiting** and **hypotension**^Q

77. Ans. a. Perforated peptic ulcer

78. Ans. b. Appendices epiploicae (Ref: Bailey 26/e p981, 25/e p1002)

PERITONEAL LOOSE BODIES (PERITONEAL MICE)

- Peritoneal loose bodies **almost never cause symptoms**^Q.
- One or more may be **found in a hernial sac** or in the **pouch of Douglas**^Q.
- The loose body may **come from an appendix epiploica**^Q that has undergone axial rotation followed by necrosis of its pedicle and detachment but they are **also found in those who suffer from subacute attacks of pancreatitis**^Q.
- These hyaline bodies attain the **size of a pea or bean** and **contain saponified fat surrounded by fibrin**.

79. Ans. c. Retroperitoneum (Ref: Bailey 26/e p985, 25/e p1007)

A retroperitoneal lipoma is often malignant (liposarcoma) and may increase rapidly in size.

RETROPERITONEAL LIPOMA

- The patient may seek advice on account of a swelling or because of **indefinite abdominal pain**.
- **Women** are more often affected. These swellings **sometimes reach an immense size**.
- **Diagnosis is usually by ultrasound and CT scanning**^Q.
- A **retroperitoneal lipoma** sometimes **undergoes myxomatous degeneration**, a complication that **does not occur in a lipoma in any other part of the body**^Q.
- Moreover, a **retroperitoneal lipoma is often malignant (liposarcoma)** and may increase rapidly in size^Q.

80. Ans. a. Ormond's disease (Ref: Schwartz 10/e p1458, 9/e p1275; <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2660836>)

RETRACTILE MESENTERITIS

- Retroperitoneal fibrosis has been associated with a variety of sclerosing diseases, among these is a variant known as **retractile mesenteritis**
- Involve predominantly the **mesentery of small intestine** and **associated vessels**, involvement of mesocolon and colon is less frequent.

81. Ans. c. Clostridium nouyi infection

82. Ans. a. Left gonadal vessels

83. Ans. b. Abdomen X-ray

84. Ans. a. Parietal peritoneum

85. Ans. a. Appendices epiploice

86. Ans. b. 4–12 months (Ref: Sabiston 19/e p1103; 18/e p1144)

MALIGNANT PERITONEAL MESOTHELIOMA

- MC primary malignant peritoneal neoplasm: **Malignant mesothelioma**^Q
- Results from malignant transformation of the simple squamoid epithelium covering the peritoneal cavity.
- **More common in males**, median age of presentation is **50 years**.
- Most patients had **exposure to asbestos**^Q.

Clinical Features

- Most patients present with **abdominal pain** and **weight loss**.
- **Ascites** is common and often **intractable**.
- **Omentum** may become **diffusely involved with tumor**, present as an **epigastric mass**.
- In contrast to pseudomyxoma peritonei, **local invasion of intra-abdominal organs**, such as the liver, intestine, bladder, and abdominal wall, **can occur**.
- **Encasement of bowel** can create a **malignant bowel obstruction**.

Diagnosis

- CT scan: Mesenteric thickening, peritoneal studding, hemorrhage within the tumor, and **ascites**^Q.

Treatment

- **Complete surgical resection** is usually **not possible** because of the extent of disease.

Prognosis

- Median survival is **4–12 months**^Q (18th edition)
- Median survival is **30–60 months** (19th edition)

Intestinal Obstruction

MULTIPLE CHOICE QUESTIONS

ACUTE INTESTINAL OBSTRUCTION

- True about strangulation of intestine is:** (MHPGMCET 2001)
 - Arterial blood flow affected first
 - Usually venous blood flow affected first
 - Blood flow normal
 - No gangrene
- Most common cause of hyponatremia in surgical practice:** (MHPGMCET 2008)
 - Small intestinal obstruction
 - Duodenal fistula
 - Pancreatic fistula
 - Intussusception
- Best investigation for acute intestinal obstruction is:** (Recent Question 2014)
 - Barium studies
 - X-ray
 - USG
 - ERCP
- Early sign of intestinal strangulation:** (PGI SS June 2001)
 - Continuous pain
 - Abdominal rigidity and shock
 - Abdominal fluid
 - Dilated bowel loops on USG
- The most common cause of small intestinal obstruction is:** (Recent Question 2014)
 - Intussusception
 - Iatrogenic adhesions
 - Trauma
 - Carcinoma
- Commonest cause of acute intestinal obstruction is:** (NEET Pattern, PGI 88)
 - Adhesions
 - Volvulus
 - Inguinal hernias
 - Internal hernias
- The commonest cause of intestinal obstruction in a 30 years old Indian female:** (All India 93)
 - TB stricture
 - Crohn's disease
 - Post op. adhesions
 - Adenocarcinoma
- Acute intestinal obstruction is characterized by:** (PGI Dec 2003)
 - Vomiting is common in duodenal obstruction
 - Pain after each attack of vomiting is characteristic of ileal obstruction
 - In colonic obstruction distension is common than vomiting
 - X-ray erect posture is diagnostic
 - Colicky pain to steady pain indicates strangulation
- Features of intestinal obstruction : clinically/ investigation by:** (PGI June 2006)
 - Abdominal distension
 - Vomiting
 - Fluid level in X-ray >4
 - Localized tenderness
 - Diarrhea
- In intestinal obstruction, investigations needed are:** (PGI Dec 2001)
 - Barium swallow
 - Intestinal barium meal
 - Stomach barium meal
 - Erect X-ray abdomen
 - Supine X-ray abdomen
- A 30-years old lady presented with acute pain abdomen, constipation and vomiting suspecting acute intestinal obstruction. The investigation of choice for the patient is:** (PGI June 2003)
 - X-ray abdomen erect posture
 - Ba enema
 - USG
 - CT scan
- A women of 35-years, comes to emergency department with symptoms of pain in abdomen and bilious vomiting but no distension of bowel. Abdominal X-ray showed no air fluid level. Diagnosis is:** (Recent Question 2014; AIIMS June 2009)
 - CA rectum
 - Duodenal obstruction
 - Adynamic ileus
 - Pseudo-obstruction
- One of the following will always present with bilious vomiting:** (All India 94)
 - Pyloric stenosis
 - Esophageal atresia
 - Atresia of the 3rd part of the duodenum
 - Malrotation of the gut
- Distended abdomen in intestinal obstruction is mainly due to:** (All India 95, PGI Dec 98)
 - Diffusion of gas from blood
 - Fermentation of residual food
 - Bacterial action
 - Swallowed air
- In case of new born, the commonest cause of intestinal obstruction is:** (AIIMS Nov 95)
 - Annular pancreas
 - Duodenal atresia
 - Jejunal atresia
 - Esophageal atresia
- Regarding adhesive intestinal obstruction, true is:** (AIIMS Nov 94)
 - Avoid surgery for initial 48-72 hours
 - Never operate
 - Operate after minimum 10 days of conservative treatment
 - Immediate operation
- Water loss is severe if intestinal obstruction occurs at:** (JIPMER 90)
 - First part of duodenum
 - Third part of duodenum
 - Mid-jejunum
 - Ileum

18. The first to appear in a cause of acute intestinal obstruction is: (PGI 82, DNB 90)

- a. Constipation b. Colicky pain
- c. Vomiting d. Distension

19. Primary feature of small intestinal obstruction: (APPG 96)

- a. Fever b. High peristalsis with colic
- c. Abdominal distension d. Empty rectum

20. Best way to diagnose lower small intestinal obstruction:

- a. Pain abdomen (PGI 96)
- b. Abdominal distension
- c. Profuse vomiting
- d. Multiple air gas shadows on X-ray

21. For intestinal obstruction immediate operation should not be done in case of: (Kolkata 2000)

- a. Postop adhesion b. Appendix perforation
- c. Volvulus d. Obstructed hernia

22. Which of the following is most suggestive of neonatal small bowel obstruction? (All India 2003)

- a. Generalized abdominal distension
- b. Failure to pass meconium in the first 24 hours
- c. Bilious vomiting
- d. Refusal of feeds

23. What is the sure sign of intestinal obstruction?

(Recent Question 2013)

- a. Vomiting and distension b. Jelly like stool
- c. Diarrhoea d. Localized tenderness

24. Ileal obstruction due to round worm obstruction treatment is: (Recent Question 2013)

- a. Resection with end to end anastomosis
- b. Resection with side to side anastomosis
- c. Enterotomy, removal of worms and primary closure
- d. Diversion

INTUSSUSCEPTION

25. A neonate presents with colicky pain and vomiting with sausage-shaped lump in the abdomen, diagnosis is:

(UPPG 2009)

- a. Enterocolitis b. Perforation of the abdomen
- c. Intussusception d. Acute appendicitis

26. All statement about adult intussusception are true except:

- a. Idiopathic and more enteric rather than colonic
- b. Lead point present in majority of cases (PGI Nov 2009)
- c. Resection of bowel is adequate for large bowel intussusception
- d. Hydrostatic reduction with barium or air are done if bowel is not gangrenous

27. A previously healthy infant presents with recurrent episode of abdominal pain. The mother says that the child has been passing altered stool after episodes of pain, but gives no history of vomiting or bleeding per rectum. Which of the following is the most likely diagnosis? (All India 2011)

- a. Rectal polyps
- b. Intussusception
- c. Meckel's diverticulum
- d. Necrotizing enterocolitis

28. True about Intussusceptions in children: (PGI Nov 2010)

- a. Most common variety is ileocolic
- b. Associated with pathological lead point
- c. May be seen after viral infection
- d. Can be relieved by barium enema
- e. Surgery is always indicated

29. True statement about treatment of intussusception:

(PGI Nov 2010)

- a. Air enema b. Saline enema
- c. Ba enema d. Hydrostatic reduction
- e. Colonoscopy is always done to confirm diagnosis

30. Intussusception usually begins from:

(DNB 2007)

- a. Jejunum b. Terminal ileum
- c. Colon d. Rectum

31. The most common type of intussusception:

(DNB 2009, 2005, 2001, 2000, All India 99, PGI Dec 95, MHPGMCET 2009)

- a. Ileocolic b. Colocolic
- c. Ileoileal d. Retrograde

32. All are true about intussusception except:

- a. Barium must be used in children after 48 hours
- b. X-ray shows paucity of colonic gas (AIIMS GIS May 2011)
- c. X-ray shows lump shadow
- d. USG show pseudo-kidney sign

33. A child was operated for small intestine mass with intussusception and after the operation the tumor was diagnosed in histological section. Which is the most likely tumor associated? (AIIMS Nov 2012)

- a. Carcinoid b. Villous adenoma
- c. Lymphoma d. Smooth muscle tumor

34. What is intussusceptions? (Recent Question 2014; PGI Dec 97)

- a. The entire complex of intussusception
- b. The entering layer
- c. The outer layer
- d. The process of reducing the intussusception

35. A 10-months old infant presents with acute intestinal obstruction. Contrast enema X-ray shows the intussusceptions. Likely cause is: (All India 2002)

- a. Payers patch hypertrophy b. Meckel's diverticulum
- c. Mucosal polyp d. Duplication cyst

36. Features of intussusceptions are:

(PGI June 2001)

- a. Pincer sign b. Target sign
- c. Dove sign d. Coiled spring sign
- e. Dance sign

37. Recurrent pain abdomen with intestinal obstruction and mass passes per rectum goes in favor of:

(PGI Dec 99)

- a. Internal herniation b. Stricture
- c. Strangulated hernia d. Intussusception

38. Recurrent obstruction, mass per rectum and diarrhea in child:

(Recent Question 2014; PGI June 2000)

- a. Intussusception b. Rectal prolapsed
- c. Internal hernia d. Hemorrhoids

39. Commonest cause of intussusception is: (WBPG 2015; TN 90)

- a. Submucous lipoma
- b. Meckel's diverticulum
- c. Hypertrophy of submucous Peyer's patches
- d. Polyp

40. Intussusception is frequently associated with:

(JIPMER 2014, 2012)

- a. Submucosal lipoma b. Intramural lipoma
- c. Subserosal lipoma d. Subfascial lipoma

41. Which of the following is true about intussusception?

(DPG 2005, All India 91)

- a. Common in neonates
- b. Fever always present
- c. Not associated with tumors of intestine
- d. Usually relieved by barium enema

42. The least common type of intussusception is:
(PGI 81, APPG 89)

- a. Multiple
- b. Colocolic
- c. Ileoileal
- d. Ileocolic

43. Henoch-Schnlein purpura may rarely cause:
(JIPMER 80, 81, AIIMS 90)

- a. Intussusception
- b. Volvulus
- c. Atrial fibrillation
- d. Hernia

44. Claw sign seen in:
(APPG 2008)

- a. Intussusception
- b. Volvulus
- c. Both
- d. None

45. Complete treatment of intussusception is indicated by:
(APPG 2008)

- a. Free passage of barium in the terminal ileum
- b. Passage of feces and flatus along with barium
- c. Improvement of clinical condition
- d. None

46. A 12-months old male child suddenly draws up his legs and screams with pain. This is repeated periodically throughout the night interspersed with periods of quiet sleep. When seen after 12 hours the child looks pale, has just vomited and passed thin blood-stained stool; there is a mass around umbilicus. What is the most likely diagnosis? (UPSC 97)

- a. Appendicitis
- b. Intussusception
- c. Gastroenteritis
- d. Roundworm obstruction

47. Sign of Dance is:
(MAHE 2005)

- a. Empty right iliac fossa in intussusception
- b. Pincer shaped appearance in barium enema in intussusception
- c. Tenderness at the McBurney's point
- d. Passing of large quantities of urine in hydronephrosis

48. A patient has acute abdominal pain with blood and mucus in stool with palpable mass per abdomen is due to:
(Recent Question 2014; AIIMS June 2000)

- a. Meckel's diverticulum
- b. Volvulus
- c. Intussusception
- d. Hypertrophic pyloric stenosis

49. A 6 months old child woke up in night, crying with abdominal pain, which got relieved on passing red stool. What is the most likely diagnosis? (AIIMS November 2014)

- a. Meckel's diverticulum
- b. Intussusception
- c. Malrotation
- d. Intestinal obstruction

MECONIUM SYNDROME

50. A new born child has not passed meconium for 48 hours. What is the diagnostic procedure of choice? (All India 2008)

- a. USG
- b. Contrast enema
- c. CT
- d. MRI

51. Snow storm ascites is seen in:
(APPG 2005)

- a. Meconium ileus
- b. Hirschsprung's disease
- c. Ileocaecal tuberculosis
- d. Pseudomyxoma peritonei

52. Extraluminal abdominal calcifications in the newborn may be seen in:
(COMEDK 2010)

- a. Meconium aspiration
- b. Hirschsprung's disease
- c. Meconium peritonitis
- d. Meconium plug syndrome

53. Intra-abdominal calcification in a plane X-ray abdomen is most often seen in:
(Karnataka 95)

- a. Meconium ileus
- b. Meconium peritonitis
- c. Meconium plug syndrome
- d. Necrotising enterocolitis

54. Which one of the following statements regarding meconium peritonitis is not correct?
(UPSC 2000)

- a. It is a septic peritonitis
- b. It develops in later intra-uterine life or during or just after delivery
- c. This condition should always be considered when a baby is born with tense abdomen
- d. Plain X-ray abdomen of this condition reveals calcification on liver and spleen

55. Meconium ileus is associated with:
(All India 2000, 98, 96)

- a. Fibrocystic disease of pancreas
- b. Liver aplasia
- c. Cirrhosis of liver
- d. Malnutrition

56. Fluid levels are not visible in:
(PGI June 98)

- a. Meconium ileus
- b. Intussusception
- c. Colon pouch
- d. Duodenal obstruction

57. A new born girl not passed meconium for 48 hours, has abdominal distention and vomiting. Initial investigation of choice would be:
(AIIMS Nov 2007)

- a. Manometry
- b. Genotyping for cystic fibrosis
- c. Lower GI contrast study
- d. Serum trypsin immunoblot

58. Meconium peritonitis occurs:
(PGI June 99)

- a. Just before birth
- b. Just after birth
- c. Before and after birth
- d. Due to birth trauma

MESENTERIC ISCHEMIA

59. Occlusion to superior mesenteric artery affects jejunum and:
(UPPG 2010)

- a. Pyloric antrum
- b. Fundus of stomach
- c. Duodenum distal to the opening of CBD
- d. Greater curvature
- e. Descending colon

60. Most common cause of acute mesenteric ischemia is:
(AIIMS May 2011, Nov 2008)

- a. Arterial thrombosis
- b. Venous thrombosis
- c. Embolism
- d. Non occlusive disease

61. All are causes of dynamic intestinal obstruction except:
(JIPMER 2010)

- a. Gallstones
- b. Bands
- c. Intussusception
- d. Mesenteric vascular occlusion

62. A young female complains of pain in umbilical region since few days, which is more especially after taking meals. What is the likely diagnosis?
(MHSSMCET 2005)

- a. Peptic ulcer disease
- b. Meckel's diverticulum
- c. Typhlit
- d. Abdominal angina

63. If patient with superior mesenteric artery thrombosis doesn't develop collateral circulation, then what is the best treatment?
(MHSSMCET 2005)

- a. Resection anastomosis
- b. Endarterectomy
- c. Arterial reconstruction
- d. Papaverine injection

64. Which of the following is a common cause of abdominal angina? (MHSSMCET 2006)
- SMA thrombosis
 - SMA embolism
 - SMA aneurysm
 - SMA rupture
65. Ischemia of which of the vessel would cause least damage?
- Renal artery
 - SMA (AIIMS Nov 2011)
 - IMA
 - Celiac trunk
66. All are true about non-obstructive mesenteric ischemia except: (AIIMS GIS Dec 2006)
- Vasopressor treatment
 - Cardiac shock
 - Burns
 - Hypercoagulable state
67. All are true about acute mesenteric ischemia except:
- Branch point of middle colic artery is most common location for embolism (AIIMS GIS 2003)
 - Acute venous thrombosis is best judged on CT
 - Non-obstructive mesenteric ischemia has very good prognosis
 - Gold standard investigation is angiography
68. All are true about mesenteric ischemia except: (AIIMS GIS 2003)
- Due to embolism to SMA
 - Most common cause is AF
 - Embolus gets lodged most commonly at branching of SMA from aorta
 - Most common cause of small bowel syndrome in adults
69. Type of mesenteric ischemia best visualized by CECT: (AIIMS GIS Dec 2006)
- Mesenteric ischemia by embolic occlusion
 - Acute mesenteric artery thrombosis
 - Non-occlusive mesenteric ischemia
 - Acute mesenteric venous thrombosis
70. 65-years old Ramdeen presents with abdominal pain and distension of abdomen. His stools were maroon colored and he gives a past history of cerebrovascular accident and myocardial infarction. What will be the probable diagnosis? (AIIMS Nov 2000, Nov 97)
- Ulcerative colitis
 - Acute mesenteric ischemia
 - Irritable bowel syndrome
 - Crohn's disease
71. A man aged 60 years has history of IHD and atherosclerosis. He presents with abdominal pain and maroon stools. Most likely diagnosis: (All India 2001)
- Acute intestinal obstruction
 - Acute mesenteric ischemia
 - Peritonitis
 - Appendicitis
72. True about mesenteric vein thrombosis: (PGI Dec 2003)
- Peritoneal signs always present
 - Thrombectomy is always done
 - Heparin is given
 - Surgery can lead to short bowel syndrome
73. True about mesenteric vein thrombosis: (PGI Dec 2000)
- Peritoneal signs are always present
 - Invariably involves long length of bowel
 - I.V. Heparin is the treatment of choice
 - Surgery can lead to short-bowel syndrome
75. Paralytic ileus is seen in: (PGI June 99)
- Spinal cord injury
 - Hypocalcemia
 - Hypermagnesemia
 - Uremia
76. Prolonged post-op ileus is best treated by: (PGI Dec 98)
- Long tube insertion
 - Calcium pentonthenate
 - Laparotomy and exploration
 - Peristaltic stimulants
77. First to recover from post-operative ileus: (DNB 2008)
- Small intestine
 - Stomach
 - Colon
 - None
78. Paralytic ileus is characterized by all except: (SGPGI 2005)
- No bowel sound on auscultation
 - No passage of flatus
 - Gas filled loops of intestine with multiple fluid levels
 - Loops of intestine are not seen due to loss of peristalsis
79. Routine management of paralytic ileus includes all of the following except: (MCI March 2005)
- Electrolyte correction
 - Nasogastric aspiration
 - Parasympathomimetics
 - IV fluids
80. True about postoperative ileus is: (MHPGMCET 2003)
- No intestinal sounds heard
 - Intestinal peristalsis never becomes normal again
 - Is due to hypernatremia
 - Begins 2-3 days postoperatively
81. Most common electrolyte imbalance that causes Paralytic ileus is: (DNB 2014)
- Hyponatremia
 - Hypernatremia
 - Hypokalemia
 - Hyperkalemia
82. First to recover from post-operative ileus is: (DNB 2014)
- Small intestine
 - Stomach
 - Colon
 - None

LARGE BOWEL OBSTRUCTION

83. A patient has presented with left sided colonic malignancy with obstruction in emergency. What is the treatment of choice? (MHSSMCET 2005)
- Hartman's Procedure
 - Total colectomy
 - Left hemi-colectomy
 - Defunctioning colostomy
84. Treatment of obstructing, resectable right colonic cancer:
- Ileotransverse anastomosis after right hemicolectomy
 - Diverting ileostomy (AIIMS GIS Dec 2010)
 - Subtotal colectomy with ileorectal anastomosis
 - Subtotal colectomy with exteriorization of the both ends
85. A patient of CA rectum presents with obstruction. Treatment: (PGI SS June 2006)
- Defunctioning colostomy
 - Hartmann's procedure
 - Anterior resection
 - Abdomino-perineal resection
86. What are the features of colonic obstruction? (PGI Dec 2000)
- No passage of gas absolutely (Obstipation)
 - No passage of stools absolutely
 - Distention of abdomen
 - Mild fever initially
 - Fecal vomitus
87. Most common cause of colonic obstruction is: (AMI 86, PGI 86, UPSC 88)
- Volvulus
 - Hernia
 - Adhesions
 - Neoplasm

PARALYTIC ILEUS

74. Post-operative ileus is most pronounced in: (AIIMS Nov 2011, AIIMS GIS Dec 2010)
- Colon
 - Stomach
 - Ileum
 - Duodenum

88. In obstruction of the large gut rupture occurs at the: (PGI 89)
 a. Cecum b. Ascending colon
 c. Transverse colon d. Descending colon
89. Commonest cause of colonic obstruction in neonates is: (TN 90)
 a. Meconium ileus b. Aganglionic colon
 c. Ileal atresia d. Volvulus
90. Acute mechanical large bowel obstruction should be operated early because: (UPSC 95)
 a. Electrolyte imbalance due to third space loss
 b. Septicemia from absorption of bowel contents
 c. Early gangrene and perforation
 d. Respiratory embarrassment to massive abdominal distension
91. Acute mechanical large bowel obstruction should be operated early because of the risk of: (UPSC 97)
 a. Respiratory embarrassment due to abdominal distension
 b. Electrolyte imbalance from vomiting
 c. Septicemia from bowel contents
 d. Closed-loop obstruction and cecal perforation

PSEUDO-OBSTRUCTION

92. Ogilvie's syndrome results from the denervation of the colon distal to the: (COMEDK 2006)
 a. Hepatic flexure
 b. Mid-transverse colon
 c. Splenic flexure
 d. Descending colon
93. True about Ogilvie's syndrome are all except: (Recent Question 2015; AIIMS Nov 2007)
 a. It is caused by mechanical obstruction of the colon
 b. It involves entire/part of the large colon
 c. It occurs after previous surgery
 d. It occurs commonly after narcotic use
94. Investigation of choice for pseudo-obstruction: (AIIMS GIS Dec 2006)
 a. Water soluble contrast enema
 b. Barium enema
 c. CECT
 d. Colonoscopy
95. Colonic Pseudo-obstruction occurs in all, except: (AIIMS June 94)
 a. Diabetes mellitus b. Dermatomyositis
 c. Scleroderma d. Hyperthyroidism
96. A 56-years old woman has not passed stools for the last 14 days. X-ray shows no air fluid levels, Probable diagnosis is:
 a. Paralytic ileus (Recent Question 2014; All India 2001)
 b. Aganglionosis of the colon
 c. Intestinal pseudo-obstruction
 d. Duodenal obstruction

97. Acute pseudo-obstruction of the colon known as: (DNB 2012, UPPG 2007)
 a. Sjogren's syndrome b. Gardener's syndrome
 c. Ogilvie's syndrome d. Peutz-Jegher's syndrome

VOLVULUS

98. Sigmoid volvulus: (PGI SS Dec 2009)
 a. Clockwise
 b. CECT is diagnostic
 c. Rigid sigmoidoscopy is the initial treatment
 d. Sigmoidectomy is contraindicated

99. Most common site of volvulus: (DNB 2012, GB PANT 2011)
 a. Sigmoid colon b. Caecum
 c. Transverse colon d. Stomach

100. False about volvulus: (AIIMS GIS May 2008)
 a. Sigmoid volvulus is most common
 b. In absence of ischemia, mesocolopexy is done
 c. Ogilvie's syndrome refers to cecal volvulus
 d. Elective sigmoid resection after detorsion
101. False regarding cecal volvulus: (ILBS 2011)
 a. Present with small bowel obstruction
 b. Present with air fluid levels in right upper quadrant and convexity towards left
 c. Endoscopic derotation is not effective like sigmoid volvulus
 d. Cecopexy can be a form of treatment
102. In cecal volvulus: (AIIMS GIS Dec 2006)
 a. Resolves with endoscopic treatment as frequently as sigmoid volvulus
 b. Right hemicolectomy is the treatment of choice
 c. Conservative management
 d. Colonoscopic decompression
103. Obstruction with multiple air fluid levels in a newborn, suggest diagnosis of: (MHSSMCET 2010)
 a. Duodenal atresia b. Ileal atresia
 c. Ladd's band d. Midgut volvulus
104. 'Bird of prey' sign is seen in the radiographic barium examination of: (COMEDK 2008)
 a. Gastric volvulus b. Intussusception
 c. Sigmoid volvulus d. Cecal volvulus
105. True about colonic volvulus: (PGI Nov 2010)
 a. Most common in caecum
 b. Common in psychiatric patient
 c. Bird's beak sign
 d. May present as intestinal obstruction
106. False about cecal volvulus: (AIIMS GIS 2003)
 a. Mostly resolve with colonoscopic reduction
 b. More common than cecal basecule
 c. Right hemicolectomy is TOC
 d. Truly is cecocolic volvulus
107. Which of the following statement about volvulus is false?
 a. More common in psychiatric patients (All India 2008)
 b. Sigmoid volvulus is more common than caecal volvulus
 c. Lower GI scopy is contraindicated in sigmoid volvulus
 d. Volvulus of caecum is managed by conservative methods
108. Coffee bean sign is usually seen in: (J and K 96)
 a. Volvulus
 b. Pyloric obstruction
 c. Intussusception
 d. Intestinal obstruction
109. Definitive treatment of sigmoid volvulus is: (PGI June 97)
 a. Surgical correction b. Colectomy
 c. Enema d. Endoscopic correction
110. Predisposing factors for sigmoid volvulus are: (Kerala 97)
 a. Band of adhesion
 b. Long pelvic mesocolon
 c. Narrow attachment of pelvic mesocolon
 d. Loaded pelvic colon
 e. All of the above
111. Rotation of sigmoid volvulus occurs: (AMU 2005)
 a. Clockwise
 b. Anticlockwise
 c. Initially clockwise later anticlockwise
 d. Either clockwise or anticlockwise

- 112. Sigmoid volvulus rotation occurs:** (UPPG 2007, 2005)
- Clockwise
 - Anticlockwise
 - Both clockwise and anti clockwise
 - Axial in direction

- 113. Which of the following statements about sigmoid volvulus is incorrect?** (DPG 2009 March)
- More common with laxative abuse
 - Non-operative treatment has no role
 - Recurrence rate around 40%
 - Sigmoid resection is definitive treatment

- 114. All are predisposing factors for sigmoid volvulus except:** (DNB 2007)
- | | |
|---------------------------|--------------------|
| a. Hirschprung's diseases | b. Chagas diseases |
| c. Chronic constipation | d. Tuberculosis |
- 115. Least common volvulus site in neonate is:** (JIPMER 2013)
- | | |
|-------------------------|-------------------------|
| a. Ilioileal | b. Large bowel volvulus |
| c. Small bowel volvulus | d. Gastric volvulus |

MALROTATION

- 116. Child presents with recurrent abdominal pain and bilious vomiting. Condition was diagnosed by barium follow through. Surgery was done, mesenteric widening, appendectomy, cutting the Ladd's band. What is the diagnosis?** (AIIMS Nov 2010)
- Recurrent cecal volvulus
 - Malrotation
 - Recurrent appendicitis
 - Stricture TB
- 117. The cecum is found to be placed below the stomach and in the midline. Which of the following abnormality must have taken place while rotation of the gut?** (AIIMS Nov 2010)
- | | |
|----------------------|-------------------|
| a. Non-rotation | b. Malrotation |
| c. Reversed rotation | d. Mixed rotation |

- 118. Malrotation presents as:** (PGI Dec 2002)
- | | |
|---------------------|----------------|
| a. Mass abdomen | b. Bleeding PR |
| c. Bilious vomiting | d. Hematemesis |

MISCELLANEOUS

- 119. Bowel can get strangulated in all of the following space except:** (AIIMS Nov 2000)
- | | |
|------------------------|---------------------|
| a. Rectouterine pouch | b. Ileocolic recess |
| c. Paraduodenal recess | d. Omental recess |
- 120. Spastic ileus is seen in:** (PGI Dec 99)
- Porphyria
 - Retroperitoneal abscess
 - Hypokalemia
 - MI
- 121. True about visceral pain:** (PGI Nov 2011)
- It is poorly localized
 - Resembles "fast pain" produced by noxious stimulation of the skin
 - Mediated by B fibers in the dorsal roots of the spinal nerves
 - Causes relaxation of nearby skeletal muscles
 - Shows relatively rapid adaptation
- 122. A young healthy male patient presented with abdominal pain and history of altered bowel habits from the last 6 months. On CT examination, there was dilated distal part of ileum, thickened ileocecal junction with thickened cecum with presence of sacculations on the antimesenteric border. The vascularity of adjoining mesentery is also increased and there is surrounding mesentery fat. Which of the following is not a differential diagnosis?** (AIIMS Nov 2013)
- Ulcerative colitis
 - Crohn's disease
 - Tuberculosis
 - Ischemic bowel disease

EXPLANATIONS

ACUTE INTESTINAL OBSTRUCTION

1. Ans. b. Usually venous blood flow affected first (Ref: Sabiston 19/e p1236-1244; Schwartz 9/e p988-992; Bailey 26/e p1186-1191, 25/e p1189-1191; Shackelford 7/e p864-872)
 - Venous return is compromised before arterial supply in strangulated intestinal obstruction^Q.

SMALL BOWEL OBSTRUCTION

- Adhesions secondary to previous surgery are the **MC cause of SBO**^Q.
 - Causes: Adhesions (60%) > Malignant tumors (20%) > Hernia (10%) > Crohn's disease (5%)^Q
 - Metastatic or peritoneal carcinomatosis are the **MC malignancies** leading to SBO^Q.
 - Primary colonic cancers (particularly those arising from the cecum and ascending colon) may present as a SBO^Q.
- Pathophysiology:**
- Early in the course of an obstruction, **intestinal motility and contractile activity increase** in an effort to propel luminal contents^Q past the obstructing point.
 - Increase in peristalsis early in the course of bowel obstruction is present **both above and below the point of obstruction**^Q (diarrhea in partial or even complete small bowel obstruction in the early period)
 - Later in the course of obstruction, the **intestine becomes fatigued and dilates**^Q, with contractions becoming less frequent and less intense.
 - As the **bowel dilates**, **water and electrolytes accumulate** both **intraluminally** and in the **bowel wall**^Q itself.
 - This massive third-space fluid loss accounts for the **dehydration and hypovolemia**^Q.
 - The **metabolic effects of fluid loss depend on** the site and **duration** of the obstruction.
 - As the **intraluminal pressure increases** in the bowel, a **decrease in mucosal blood flow** can occur.
- Clinical Features:**
- In most patients, a **meticulous history** and **physical examination** complemented by **plain abdominal radiographs** are all that is required to **establish the diagnosis** and to devise a treatment plan.
 - Cardinal symptoms of intestinal obstruction: **Colicky abdominal pain (1st symptom)**^Q, nausea, vomiting, **abdominal distention**, and a **failure to pass flatus and feces** (i.e., **obstipation**)^Q.
 - Typical crampy abdominal pain occurs in **paroxysms** at 4- to 5-minute intervals and occurs less frequently with distal obstruction^Q.
 - Nausea and vomiting are **more common** with **proximal obstruction**.
 - Cramping abdominal pain is the **initial and most prominent symptom** in distal obstruction^Q
 - Abdominal distention is **more common** in distal obstruction^Q
 - **Abdominal distention** occurs as the obstruction progresses, and the **proximal intestine becomes increasingly dilated**^Q.
 - As the **obstruction becomes more complete** with **bacterial overgrowth**, the **vomit becomes more feculent**, indicating a **late and established intestinal obstruction**^Q.
 - Patient may present with **tachycardia** and **hypotension**^Q, demonstrating the severe dehydration that is present.
 - **Fever suggests** the possibility of **strangulation**^Q.
 - **Abdominal distention** is dependent on the **level of obstruction**^Q.
 - Early in the course of bowel obstruction, **peristaltic waves** can be observed, particularly in **thin patients**, and auscultation of the abdomen may demonstrate **hyperactive bowel sounds** with **audible rushes** associated with **vigorous peristalsis**^Q (i.e., borborygmi).
 - Late in the obstructive course, **minimal or no bowel sounds** are noted.
 - **Localized tenderness, rebound, and guarding** suggest **peritonitis** and the likelihood of **strangulation**^Q.
 - **Rectal examination:** To assess for **intraluminal masses** and to **examine the stool** for **occult blood**^Q (an indication of malignancy, intussusception, or infarction)
- Diagnosis**
- X-ray Abdomen: Confirm the clinical suspicion and define more accurately the **site of obstruction** (60% diagnostic accuracy)^Q
 - **Supine radiographs:** Dilated loops of small intestine^Q without evidence of colonic distention, **diagnose site and level of obstruction**^Q
 - **Erect radiographs:** Multiple air-fluid levels, which often layer in a **stepwise pattern**^Q
 - **Supine films are better than erect** for **diagnosis of intestinal obstruction**^Q

CT Scan

- Used in **complex patients**, in whom the **diagnosis is not readily apparent**^Q
 - **Highly sensitive** for **diagnosing complete** or **high-grade obstruction** of the **small bowel** and for **determining the location and cause of obstruction**.
 - **Less sensitive** for **partial small bowel obstruction**^Q
 - Useful for **extrinsic cause** of bowel obstruction (e.g. abdominal tumors, inflammatory disease, or abscess) and **determining bowel strangulation**
- Enteroclysis is investigation of choice in **low-grade, intermittent SBO**^Q
 - **Barium studies**: Precisely demonstrate the **level of the obstruction** and **cause** in certain cases^Q
 - **Ultrasound**: Useful in **pregnant patients**^Q
- **Leukocytosis** may be found in patients with **strangulation**, but **does not necessarily denote strangulation**^Q.
 - Absence of leukocytosis does not eliminate strangulation as a possibility.

2. Ans. a. Small intestinal obstruction (Ref: Bailey 24/e p56)

Hyponatremia

- The **most frequent cause** of **sodium depletion** in **surgical practice** is **obstruction** of the **small intestine**^Q, with its rapid loss of gastric, biliary, pancreatic and intestinal secretions by antiperistalsis and ejection, whether by vomiting or aspiration.
- **Duodenal, total biliary, pancreatic and high intestinal external fistulae** are all notorious for bringing about **early** and **profound hyponatremia**^Q.

3. Ans. b. X-ray

4. Ans. a. Continuous pain (Ref: Sabiston 19/e p1241; Schwartz 9/e p988-990; Bailey 26/e p1182, 1187, 25/e p1188-1189, 1194; Shackelford 7/e p866)

Simple Obstruction	Strangulating Obstruction
<ul style="list-style-type: none"> • Simple obstructions that involve mechanical blockage of the flow of luminal contents^Q • Vascular supply is not compromised^Q 	<ul style="list-style-type: none"> • Usually involves a closed-loop obstruction^Q • Vascular supply to a segment of intestine is compromised^Q, can lead to intestinal infarction. • Associated with an increased morbidity and mortality risk^Q • Classic signs: Tachycardia, fever, leukocytosis, and a constant, noncramping abdominal pain^Q. • CT scan: Useful only in detecting the late stages of irreversible ischemia (e.g. pneumatosis intestinalis, portal venous gas)^Q.

5. Ans. b. Iatrogenic adhesions

6. Ans. a. Adhesions

7. Ans. c. Postoperative adhesions

8. Ans. a. Vomiting is common in duodenal obstruction, c. In colonic obstruction distension is common than vomiting, d. X-ray erect posture is diagnostic, e. Colicky pain to steady pain indicates strangulation (Ref: Sabiston 19/e p1242-1243; Schwartz 9/e p990-991; Bailey 26/e p1190-1194, 25/e p1196-1198; Shackelford 7/e p870-872)

TREATMENT OF ACUTE INTESTINAL OBSTRUCTION

- **Fluid Resuscitation and Antibiotics**^Q: Aggressive intravenous (IV) replacement with an isotonic saline solution such as lactated Ringer's.
- **Urine output** should be monitored by the placement of a Foley catheter.
- **Elderly patients** may require **central venous assessment**^Q
- **Tube Decompression**^Q: Nasogastric suction **reduces the risk of pulmonary aspiration** of vomitus and minimizing further intestinal distention from preoperatively swallowed air.

- Patients with a **partial intestinal obstruction** may be **treated conservatively** with **resuscitation and tube decompression** alone^Q.
- **Resolution of symptoms** and discharge **without** the need for **surgery** has been reported in **60–85%** of patients with a **partial obstruction**^Q.

- **Clinical deterioration** of the patient or **increasing small bowel distention** on abdominal radiographs **during tube decompression** warrants **prompt operative intervention**^Q.

Operative Management

- **Complete SBO** requires **operative intervention**^Q.
- **Adhesiolysis**: In cases of intestinal obstruction secondary to an **adhesive band**^Q
- **Incarcerated hernias** can be managed by **manual reduction** of the herniated segment of bowel and **closure of the defect**^Q.

Consideration of laparoscopic management in patients with

- **Mild abdominal distention^Q** allowing adequate visualization
- **Proximal obstruction^Q**
- **Partial obstruction^Q**
- Anticipated **single-band obstruction^Q**

9. Ans. a. Abdominal distension, b. Vomiting
 10. Ans. d. Erect X-ray abdomen, e. Supine X-ray abdomen
 11. Ans. a. X-ray abdomen erect posture
 12. Ans. b. Duodenal obstruction (Ref: Sabiston 19/e p1239; Schwartz 9/e p988; Bailey 26/e p1186, 25/e p1192-1194; Shackelford 7/e p866)
- Abdominal pain, bilious vomiting without abdominal distention is suggestive of proximal small intestinal obstruction, distal to ampulla of Vater (Duodenal obstruction).
 - Nausea and vomiting are more common with proximal obstruction^Q
 - Abdominal distention is more common in distal obstruction^Q

13. Ans. c. Atresia of the 3rd part of the duodenum
 14. Ans. d. Swallowed air (Ref: Sabiston 19/e p1238-1239; Schwartz 9/e p988; Bailey 26/e p1186, 25/e p1189; Shackelford 7/e p866)

Cause of Abdominal Distention	
Gas	Fluid
<ul style="list-style-type: none"> • Swallowed air^Q is the major source (Nitrogen^Q is not well absorbed by intestinal mucosa) • Gases produced by bacterial fermentation (H_2, CO_2, CH_4) 	<ul style="list-style-type: none"> • Enormous quantities of fluid from the extracellular space are lost into gut (third space loss) • Net GI secretion is enhanced in obstruction

15. Ans. b. Duodenal atresia (Ref: Bailey 26/e p120, 1193, 25/e p1199)
- MC site of intestinal atresia: Duodenum^Q
 - MC cause of neonatal intestinal obstruction: Duodenal atresia^Q
16. Ans. a. Avoid surgery for initial 48–72 hours (Ref: Sabiston 19/e p1243; Schwartz 9/e p990-991; Bailey 26/e p1192, 25/e p1198; Shackelford 7/e p872)

TREATMENT OF ADHESIVE OBSTRUCTION

- Initial management is based on intravenous rehydration and nasogastric decompression; occasionally, this treatment is curative^Q.
- Although an initial conservative regimen is considered appropriate, regular assessment is mandatory to ensure that strangulation does not occur^Q.
- Conservative treatment should not be prolonged beyond 72 hours^Q
- When, as is usual, laparotomy is required, although multiple adhesions may be found, **only one may be causative**. This should be divided and the remaining adhesions left in situ^Q unless severe angulation is present. Division of these adhesions will only cause further adhesion formation.
- When obstruction is caused by an area of multiple adhesions, the adhesions should be freed by sharp dissection^Q
- To prevent recurrence, the bare area should be covered with Omental grafts^Q.
- Laparoscopic adhesiolysis may be considered in highly selected cases of chronic subacute obstruction^Q.

17. Ans. a. First part of duodenum
 18. Ans. b. Colicky pain (Ref: Bailey 26/e p1186-1187, 25/e p1193)

SYMPTOMS OF INTESTINAL OBSTRUCTION

- Symptoms of intestinal obstruction: Pain, vomiting, distention and constipation
- Pain is the first symptom encountered^Q; it occurs suddenly and is usually severe.

Pain in Intestinal Obstruction

- It is **colicky in nature** and is usually centred on the umbilicus (small bowel) or lower abdomen (large bowel)^Q
- The pain coincides with **increased peristaltic activity^Q**
- With increasing distension, the colicky pain is replaced by a mild constant diffuse pain
- The development of **severe pain** is indicative of the **presence of strangulation^Q**
- Pain may not be a significant feature in postoperative simple mechanical obstruction and does not usually occur in paralytic ileus^Q

19. Ans. b. High peristalsis with colic
 20. Ans. d. Multiple air gas shadows on X-ray
 21. Ans. a. Postop adhesion
 22. Ans. c. Bilious vomiting
 23. Ans. a. Vomiting and distension
 24. Ans. c. Enterotomy, removal of worms and primary closure (Ref: Schwartz 9/e p990-991; Farquharson's 8/e p470; Sabiston 18/e p1295)

- Resection of small bowel is done when the affected bowel segment is of questionable viability.
- Diversion is the first step in case of colonic obstruction, followed by resection and anastomosis of affected segment and then closure of diversion colostomy at a later date.
- Intestinal luminal obstruction such as due to Bezoars or fecolihs of worm intestations are dealt with by enterotomy and removal followed by primary closure.

INTUSSUSCEPTION

25. Ans. c. Intussusception (Ref: Sabiston 19/e p1851; Schwartz 10/e p1175-1236, 9/e p1433-1434; Bailey 26/e p1184, 1187, 1193, 25/e p1191, 1196, 1198; Shackelford 7/e p1059-1061)

INTUSSUSCEPTION

- Telescoping of one portion of the intestine into the other.
- Middle layer is isolated between two sharp bends and first to become gangrenous^Q.

- (APEX) is most prone to gangrene
- Highest incidence between 4 and 10 months^Q of age
- Approx 80–90% of cases occur between 3 and 36 months^Q

- Mostly idiopathic in infants and toddlers^Q (no clear etiology).
- MC type: Ileocolic^Q

Etiology and Predisposing Factors

- Upper respiratory tract infections or gastroenteritis^Q (adenovirus and rotavirus have been implicated) have been thought to be contributory to the development of "idiopathic" intussusception. Hypertrophy of Peyer's patches^Q can be seen at surgery, but no single etiologic factor predominates.

- Approximately 5–10% of cases have a true pathologic lead point. The older the toddler, the more likely there will be a lead point^Q
- MC lead point is Meckel's diverticulum^Q

- Other lead points include polyps submucosal lipomas, the appendix, intestinal duplication, foreign bodies, and tumors such as hamartomas associated with Peutz-Jeghers syndrome.

- Henoeh-Schönlein purpura: Submucosal hemorrhage acts as a lead point^Q
- Cystic fibrosis: Risk for recurrent intussusception^Q

Clinical Features

- Typical history: Sudden, short-duration, cyclic crampy abdominal pain^Q.
- During these episodes the infant cries inconsolably with the knees drawn up^Q.
- Between episodes the infant is asymptomatic^Q.

- Vomiting is almost universal^Q
- Initially the passage of stools may be normal while later on blood mixed with mucus is evacuated- red currant jelly stool

- An abdominal mass may be palpated- a sausage shaped abdominal mass^Q (increase in size and firmness during the paroxysm of pain)
- There may be an associated feeling of emptiness in the right iliac fossa (Sign of Dance)^Q
- Occult or gross blood in 60–90% of cases on rectal examination^Q
- Apex may be palpable or even protrude from anus in extensive ileocolic or colocolic intussusception^Q

Diagnosis

- USG: Kidney-shaped mass in the longitudinal view or a target sign in the transverse view

- Hydrostatic reduction by contrast agent or air enema (preferred) is the diagnostic and therapeutic procedure of choice^Q
- Successful reduction is confirmed by reflux of air^Q (or barium) into the small bowel

Treatment

- Hydrostatic reduction by contrast agent or air enema is the diagnostic and therapeutic procedure of choice^Q.
- The success rate with air or barium reduction should exceed 70%^Q.

- Failure of reduction or the presence of peritonitis mandates operative intervention^Q, which can be performed laparoscopically or by a standard approach
- Definitive surgical procedure: Ileocolicectomy with primary anastomosis^Q

Recurrence

- Recurrence after successful hydrostatic reduction is 5–10%, recurrence rate after operative reduction is 1–4%.
- Recurrence is usually managed by hydrostatic reduction^Q.
- Third recurrence^Q is an indication for operative intervention to look for a lead point.

26. Ans. a. Idiopathic and more enteric rather than colonic (Ref: Bailey 25/e p1191)

INTUSSUSCEPTION IN ADULTS

- Bailey says "Adult cases of intussusceptions are invariably associated with a lead point, which is usually a polyp (e.g. Peutz-Jegher's syndrome), a submucosal lipoma or other tumor^Q."
- "In adults, colocolic^Q intussusception is common but in children, ileocolic is the commonest variety (77%)."

27. Ans. b. Intussusception

28. Ans. a. Most common variety is ileocolic, b. Associated with pathological lead point, c. May be seen after viral infection, d. Can be relieved by barium enema

29. Ans. a. Air enema, b. Saline enema, c. Ba enema, d. Hydrostatic reduction

30. Ans. b. Terminal ileum

31. Ans. a. Ileocolic

32. Ans. a. Barium must be used in children after 48 hours (Ref: Sabiston 19/e p1851; Schwartz 9/e p1433; Bailey 26/e p1190, 25/e p1196; Shackelford 7/e p1060-1061)

Radiological Investigations in Intussusception		
Plain X-ray Film	Barium Enema	Ultrasound
<ul style="list-style-type: none"> • Features of small intestinal obstruction^Q • Abdominal soft tissue density in some cases which may show: • Target sign^Q: Soft tissue mass with concentric area of lucency due to mesenteric fat. • Meniscus sign^Q: Crescent of gas within colonic lumen that outlines the apex of intussusception 	<ul style="list-style-type: none"> • Claw sign^Q: Rounded apex of intussusception protrudes into the contrast column • Coiled spring sign^Q: Edematous mucosal folds of returning limb of intussusception outlined by contrast material. 	<ul style="list-style-type: none"> • Target sign or Bull's eye sign on transverse scan^Q • Pseudokidney sign on longitudinal scan^Q

33. Ans. c. Lymphoma (Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Bailey 25/e p1175-1177; Shackelford 7/e p771)

SMALL-BOWEL NEOPLASM

- MC tumor of small bowel: Leiomyoma^Q > Adenoma^Q
- MC tumor of small bowel in children: Lymphoma^Q
- MC malignant tumor of small bowel: Carcinoid > Adenocarcinoma^Q
- MC site of small bowel malignancy, carcinoids, lymphoma: Ileum^Q

34. Ans. c. The outer layer

35. Ans. a. Payers patch hypertrophy

36. Ans. b. Target sign, d. Coiled spring sign, e. Dance sign

37. Ans. d. Intussusception

38. Ans. a. Intussusception

39. Ans. c. Hypertrophy of submucous Peyer's patches

40. Ans. a. Submucosal lipoma

41. Ans. d. Usually relieved by barium enema

42. Ans. a. Multiple (Ref: Bailey 24/e p1195)

Types of Intussusception (in decreasing order)	
1. Ileocolic (77%) ^Q	4. Colocolic (2%): MC in adults
2. Ileo-ileo-colic (12%)	5. Multiple
3. Ilioileal (5%)	6. Retrograde

43. Ans. a. Intussusception

44. Ans. a. Intussusception

45. Ans. a. Free passage of barium in the terminal ileum

- In intussusception, successful reduction is confirmed by reflux of air (or barium)^Q into the small bowel

46. Ans. b. Intussusception

47. Ans. a. Empty right iliac fossa in intussusceptions

48. Ans. c. Intussusception

49. Ans. b. Intussusception

MECONIUM SYNDROME

50. Ans. b. Contrast enema (Ref: Sabiston 19/e p1846-1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 119, 25/e p1199-1200; Shackelford 7/e p1053-1054)

- Failure to pass meconium in the first 2 days of life (48 hours) is typically suggestive of a lower GI tract obstruction such as Hirschsprung's disease, meconium plug syndrome or anorectal malformation. A contrast enema is the most suitable primary investigation to make the diagnosis, amongst the options provided.

MECONIUM SYNDROME

- The meconium syndromes of infancy represent a complex group of gastrointestinal conditions associated with cystic fibrosis (CF), with considerable overlap in clinical presentation and management.

- The abnormal chloride transport in patients with CF results in tenacious, viscous secretions affecting a wide variety of organs, including the intestine, pancreas, lungs, salivary glands, reproductive organs, and biliary tract^Q

- The clinical presentation of the meconium syndromes ranges from a meconium plug to simple and complicated meconium ileus^Q.

Meconium Plug

- Meconium plug syndrome is a frequent cause of neonatal intestinal obstruction
- Associated with
 - Hirschsprung's disease^Q, Maternal diabetes^Q
 - Hypothyroidism^Q, Cystic Fibrosis^Q

Clinical Features

- Affected infants are often preterm^Q
- Present with signs and symptoms of distal intestinal obstruction^Q
- Abdominal distention is a prominent feature^Q

Diagnosis

- Abdominal X-ray: Multiple dilated loops^Q of intestine.
- Diagnostic and therapeutic procedure of choice is a water-soluble contrast enema^Q.

Treatment

- Diagnostic and therapeutic procedure of choice is a water-soluble contrast enema^Q. This often results in the passage of a plug of meconium and relief of the obstruction^Q

51. Ans. a. Meconium ileus (Ref: Sabiston 19/e p1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 119, 25/e p1199-1200; Shackelford 7/e p1053-1054)

MECONIUM PERITONITIS IN MECONIUM ILEUS

- Plain X-ray of abdomen post-natally showed specks of calcification^Q mainly at the flanks, while on ultrasonography, specks of high echogenic areas seen throughout the abdomen which has been described as "snow-storm sign"^Q.

Simple Meconium Ileus

- Meconium ileus in the newborn represents the earliest clinical manifestation of CF and affects roughly 15% of patients with this inherited disease.
- In simple meconium ileus, the terminal ileum is dilated and filled with thick, tarlike, inspissated meconium^Q.
- Smaller pellets of meconium are found in the more distal ileum, leading into a relatively small colon^Q.

Clinical Features

- Present with signs and symptoms of distal intestinal obstruction^Q

Diagnosis

Abdominal X-ray in Meconium Ileus

- Dilated, gas-filled loops of small bowel^Q
- Absence of air-fluid levels^Q
- Mass of meconium within the right side of the abdomen mixed with gas to give a ground-glass or soap bubble appearance^Q.

- Investigation of choice: Water-soluble (Gastrografin) contrast enema^Q

Treatment

- **Water-soluble (Gastrografin) contrast enema** is successful in **relieving the obstruction** in up to 75% of cases^Q, with a bowel perforation rate of less than 3%.
 - **Contrast agents** are **hypertonic** relative to serum, so **infants** should be **well hydrated** and electrolytes and vital signs carefully monitored following the procedure
- **Operative management** is required when the **obstruction cannot be relieved with contrast enema**^Q.
- **Simple evacuation of the luminal meconium** without the need to create a stoma is all that is necessary in most cases.
- **Irrigate the proximal and distal bowel** with either **warmed saline solution** or **4% N-acetylcysteine**^Q.

52. **Ans. c. Meconium peritonitis** (Ref: Sabiston 19/e p1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 25/e p1199-1200; Shackelford 7/e p1054)

COMPLICATED MECONIUM ILEUS

- Meconium ileus is considered complicated when **perforation of the intestine** has taken place.
 - This may occur **in utero**^Q or the **early neonatal period**^Q
 - Meconium peritonitis is an **aseptic chemical peritonitis**^Q caused by **spillage of meconium**
- **Meconium within the peritoneal cavity** results in **severe peritonitis** with a **dense inflammatory response** and **calcification (Snow-storm sign on USG)**^Q
- The presentation of complicated meconium ileus is variable and includes formation of a **meconium pseudocyst**, **adhesive peritonitis** with or without **secondary bacterial infection**, or **ascites**^Q.

53. **Ans. b. Meconium peritonitis**

54. **Ans. a. It is a septic peritonitis**

- Meconium peritonitis is an **aseptic chemical peritonitis** caused by **spillage of meconium**

55. **Ans. a. Fibrocystic disease of pancreas** (Ref: Sabiston 19/e p1846; Schwartz 9/e p1429; Shackelford 7/e p1053-1054)

- **Meconium ileus** in the newborn represents the **earliest clinical manifestation of CF** and **affects roughly 15% of patients** with this inherited disease.

CYSTIC FIBROSIS**Diagnosis**

- The diagnosis of CF is usually confirmed in the **postoperative period**^Q.
 - The **pilocarpine iontophoresis sweat test** revealing a **chloride concentration >60 mEq/L** is the **most reliable and definitive method to confirm the diagnosis of CF**^Q. This test may not be reliable in infants and is usually performed later
- A **more immediate test** includes **detection of the mutated CFTR gene**^Q. This test, coupled with a **careful family history** and **clinical presentation**, permits confirmation of the **diagnosis in most infants**^Q.

56. **Ans. a. Meconium ileus**

57. **Ans. c. Lower GI contrast study**

58. **Ans. a. Before and after birth**

- Meconium peritonitis may occur **in utero** or the **early neonatal period**.

MESENTERIC ISCHEMIA

59. **Ans. c. Duodenum distal to the opening of CBD** (Ref: Snell 8/e p243; Bailey 25/e p911)

SUPERIOR MESENTERIC ARTERY

- **SMA** supplies the midgut, from **distal part of duodenum** to **proximal 2/3rd of transverse colon**^Q.

60. **Ans. c. Embolism** (Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p730-732; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1075-1077)

Acute Mesenteric Ischemia

- **Emboli (50%)**^Q:
 - Arrhythmia, Valvular disease^Q, Myocardial infarction
 - Hypokinetic ventricular wall
 - Cardiac aneurysm, Aortic atherosclerotic disease
- **Thrombosis (25%)**: Atherosclerotic disease
- **Nonocclusive (5–15%)**:
 - Pancreatitis, Heart failure, Sepsis^Q
 - Cardiac bypass, Burns, Renal failure^Q
- **Venous occlusion**:
 - Hypercoagulable state
 - Sepsis Compression, Pregnancy, Portal hypertension

61. Ans. d. Mesenteric vascular occlusion

62. Ans. d. Abdominal angina (Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1084-1092)

CHRONIC MESENTERIC ISCHEMIA

- CMI is most commonly the result of advanced atherosclerotic disease of multiple mesenteric arteries^Q.
- Symptomatic CMI is rare because of the good collateral circulatory network that exists between the mesenteric vessels
- Symptomatic disease is more common in females^Q
- Risk factors: Positive family history, smoking, hypertension, and hypercholesterolemia^Q.

Causes of Chronic Mesenteric Ischemia

- | | | |
|--|----------------------------------|-------------------------------------|
| • Atherosclerotic disease ^Q | • Arterial hyperplasia/dysplasia | • Inflammatory disease ^Q |
|--|----------------------------------|-------------------------------------|

Clinical Features

- Classical picture: Postprandial abdominal pain (intestinal angina or intestinal claudication) leading to an aversion to food and weight loss^Q.
- Pain is characteristically diffuse, midabdominal, midepigastria, and crampy in nature.
- Pain develops within 15–45 minutes after eating (severity related to the size of the meal ingested)

Diagnosis

- Evaluation of the mesenteric arteries frequently begins with a duplex scan.
- Aortography with AP and lateral views is diagnostic technique of choice^Q.

Treatment

- Revascularization by balloon angioplasty or stent placement for elderly patients (poor candidates for surgery). Restenosis and reintervention rates may be high (30–50%)

- | |
|--|
| <ul style="list-style-type: none"> • Definitive therapy: Surgery with transaortic endarterectomy or bypass grafting • Results of surgery are generally highly gratifying in properly selected patients, with rapid resolution of symptoms and return of weight |
|--|

- Long-term patency of the grafts is excellent, exceeding 90%.

63. Ans. a. Resection anastomosis

64. Ans. a. SMA thrombosis

65. Ans. c. IMA (Ref: Grays 40/e p1141)

- | |
|---|
| <ul style="list-style-type: none"> • Grays Anatomy: Occlusion of IMA does not always result in irreversible ischemia of the descending and sigmoid colon, because the marginal artery of colon usually receives an adequate supply from the left branch of the middle colic artery^Q |
|---|

66. Ans. d. Hypercoagulable state (Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1081-1082)

67. Ans. c. Non-obstructive mesenteric ischemia has very good prognosis

NON-OCCLUSIVE MESENTERIC ISCHEMIA

- Accounts for 20% of all cases of AMI
- Has manifestations similar to those of mesenteric arterial thrombosis, but it occurs with patent mesenteric arteries.
- Splanchnic vasoconstriction is the underlying pathophysiologic process and is precipitated by hypoperfusion from medications, depressed cardiac output, or renal or hepatic disease^Q.
- BP in the bowel falls below 40 mm Hg, ischemia develops leading to infarction and bowel necrosis.

Increased Risk of Non-occlusive mesenteric ischemia

- | | |
|---|--|
| <ul style="list-style-type: none"> • Acute myocardial infarction^Q • CHF, dysrhythmia^Q • Sepsis, hypovolemia • Use of splanchnic vasoconstrictors^{Qm} | <ul style="list-style-type: none"> • Hemodialysis patients^Q • Recent history of cardiopulmonary bypass • Major abdominal surgery^Q • Pancreatitis, aortic dissection, or burns^Q. |
|---|--|

- Nonocclusive mesenteric ischemia is typified by diffuse spasm of the SMA branches with intermittent areas of narrowing and dilation.

- | |
|---|
| <ul style="list-style-type: none"> • Arteriogram: Diffuse vasospasm with marked narrowing of the major branches of the SMA, often with the "string of lakes" appearance^Q with reflux of contrast into the aorta |
|---|

- Perfusion is markedly compromised because the intense distal vasospasm causes high peripheral resistance, with frequent reflux of contrast into the aorta.

68. Ans c. Embolus gets lodged most commonly at branching of SMA from aorta (Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1077-1078)

- More than 50% of emboli lodge in the mid to distal segment of the SMA.

EMBOLIC OCCLUSION IN ACUTE MESENTERIC ISCHEMIA

- Accounts for 40–50% of cases of AMI.
- Most emboli originate in the heart and are secondary to myocardial infarction^Q, cardiac arrhythmia, endocarditis, cardiomyopathy, ventricular aneurysm, valvular disorders, or depressed left ventricular function as a result of ischemic heart disease.
 - Most mesenteric emboli lodge in the SMA (branches from the aorta at an oblique angle)^Q
 - More than 50% of emboli lodge in the mid to distal segment of the SMA^Q
- Key to successful management: High index of suspicion leading to early diagnosis, aggressive resuscitation, and early mesenteric revascularization^Q.
- Acute SMA embolism: Sudden and dramatic symptoms because of the absence of collateral circulation.
- Severe abdominal pain contrast markedly with the absence of physical findings^Q.
- Rectal examination is not helpful because the presence of occult blood is typically a late occurrence.

69. Ans. d. Acute mesenteric venous thrombosis (Ref: Sabiston 19/e p1177; Schwartz 10/e p918-927, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1082-1084)

MESENTERIC VENOUS THROMBOSIS

- MVT accounts for 5–15% of patients with mesenteric ischemia.
- The SMV is MC involved, frequently with extension of thrombus into portal vein^Q.

- IMV is most often spared^Q
- Mortality rate is high, up to 50%^Q

Clinical Features

- Most commonly, patients complain of midabdominal colicky pain^Q
- Nausea, vomiting, diarrhea, and anorexia frequently accompany their abdominal discomfort.
- Occult blood in the stool in half of the patients, gross bleeding such as hematemesis, hematochezia, or melena occurs in approximately 15%.
- Because of the generalized nature of symptoms and relative infrequency, diagnosis is delayed.

- The past medical history or family history is often informative because venous thromboembolism^Q is part of the history in half of the patients

- Bowel infarction ultimately develops in 30–60%^Q.

Diagnosis

- Elevation of the WBC count in 50–65% of patients.
- Serum amylase is usually normal, and serum lactate is elevated only in patients with advanced bowel ischemia and suggests necrosis^Q.

- CECT with IV contrast is the diagnostic test of choice^Q for patients with suspected acute MVT

Treatment

- Rapid initiation of systemic anticoagulation^Q is important.
- Exploratory laparotomy in localized or diffuse peritoneal irritation,
- Acute thrombus in large veins: Thrombectomy followed by recombinant tissue plasminogen activator solution.
- The patient is treated with heparin intraoperatively and anticoagulation is continued postoperatively^Q.

Prognosis

- MVT have a high risk of recurrence (35–70%)^Q, most frequently within 30 days, thus emphasizing the need for early and persistent anticoagulation.
- Mortality rate is high, up to 50%.

70. Ans. b. Acute mesenteric ischemia (Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p730-736; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1077-1082)

ACUTE MESENTERIC ISCHEMIA**Clinical Features**

- Early diagnosis is the key to successful management of AMI^Q.
- Most patients have nonspecific symptoms of abdominal pain^Q.

- **Abdominal pain out of proportion** to the findings on physical examination and persisting **beyond 2 to 3 hours** is the classic picture.
- Diarrhea, nausea, vomiting, and anorexia can also be part of the initial symptom complex.
- **Melena or hematochezia in 15%**, and **occult fecal blood** is found in **half** of the patients.
- **Leukocytosis** is common.

Diagnosis

- **IOC in AMI is mesenteric arteriography^Q**

- **CT scan:** Wall **hyperdensity**, absence of wall enhancement, **wall thickening**, bowel dilation, **pneumatosis**, gas in **mesenteric vein branches** and in **portal vein branches**.
- **Hemoconcentration, leukocytosis and metabolic acidosis** is present.
- **Hyperkalemia and hyperphosphatemia** in bowel infarction should be suspected.

Treatment

- Effective management: **Early diagnosis, aggressive resuscitation, early revascularization**, and ongoing supportive care.
- **Mucosal layer is the most sensitive to ischemia**, **bacterial translocation** should be anticipated and **intravenous antibiotics^Q** used to treat the associated bacteremia.

- **Catheter-directed papaverine** to reverse the **severe mesenteric vasospasm^Q** is initiated early after arteriography
- **Anticoagulation** is given to **prevent propagation^Q** of mesenteric thrombus

- In addition to aggressively correcting the low cardiac output, terminating vasoconstrictor use, and discontinuing digitalis preparations, **intra-arterial papaverine infusion** is the **treatment of choice^Q**.
- In the **absence of peritonitis**, supportive care with **anticoagulation** and **continued papaverine** infusion is recommended.
- **Evidence of peritonitis:** Exploratory laparotomy, with conservative resection of necrotic bowel.

71. Ans. b. Acute mesenteric ischemia 72. Ans. c. Heparin is given, d. Surgery can lead to short bowel syndrome
73. Ans. d. Surgery can lead to short-bowel syndrome

Investigation of Choicem	
• Acute mesenteric ischemiam	• Angiography^Q
• Mesenteric venous thrombosis	• CECT^Q
• Chronic mesenteric ischemiam	• Aortography^Q

PARALYTIC ILEUS

74. Ans. a. Colon (Ref: Sabiston 19/e p1244; Schwartz 10/e p1151-1152, 9/e p992-993; Bailey 26/e p1197-1198, 25/e p1201-1202; Shackelford 7/e p592-593)

POST-OPERATIVE ILEUS

- Following most abdominal operations or injuries, the motility of the GI tract is transiently impaired.
- **Proposed mechanisms** responsible for this dysmotility are **surgical stress-induced sympathetic reflexes, inflammatory response mediator release, and anesthetic/analgesic effects^Q**; each of which can inhibit intestinal motility.

- **Return of normal motility:** Small intestine^Q (within 24 hours) > Gastric (48 hours)^Q > Colonic (3-5 days)^Q
- **Post-operative ileus** is most pronounced in colon^Q

- **Characteristic sequence** of return of normal motility: **Small intestinal motility** returning to normal **within the first 24 hours**, **gastric motility** within 48 hours and **colonic motility** returning to normal **3 to 5 days^Q**.
- Because **small bowel motility** is returned before **colonic and gastric motility**, listening for **bowel sounds** is **not a reliable indicator** that ileus has fully resolved^Q.

75. Ans. a. Spinal cord injury, c. Hypermagnesemia, d. Uremia (Ref: Sabiston 19/e p1244; Schwartz 10/e p1151-1152, 9/e p992-993; Bailey 26/e p1197-1198, 25/e p1201-1202; Shackelford 7/e p592-593)

PARALYTIC ILEUS

- Caused by **impaired intestinal motility**
- **Paralytic ileus** is a state in which there is **failure of transmission of peristaltic waves** secondary to **neuromuscular failure^Q**.

Pathophysiology

- The most frequently encountered factors are **abdominal operations, infection and inflammation, electrolyte abnormalities, and drugs**.

- **Characteristic sequence** of return of normal motility: **Small intestinal motility** returning to normal **within the first 24 hours**, **gastric motility** within **48 hours** and **colonic motility** returning to normal **3 to 5 days**^Q.

Paralytic Ileus: Common Etiologies	
<ul style="list-style-type: none"> • Abdominal surgery^Q • Uremia^Q 	<ul style="list-style-type: none"> • Medications: <ul style="list-style-type: none"> – Anticholinergics^Q – Opiates^Q – Phenothiazines^Q – Calcium channel blockers^Q – Tricyclic antidepressants
<ul style="list-style-type: none"> • Infection: <ul style="list-style-type: none"> – Sepsis – Intra-abdominal abscess – Peritonitis^Q – Pneumonia^Q 	<ul style="list-style-type: none"> • Hypothyroidism^Q • Ureteral colic • Retroperitoneal hemorrhage^Q • Spinal cord injury^Q • Myocardial infarction • Mesenteric ischemia^Q
<ul style="list-style-type: none"> • Electrolyte abnormalities: <ul style="list-style-type: none"> – Hypokalemia^Q – Hypomagnesemia^Q – Hypermagnesemia^Q – Hyponatremia^Q 	

Clinical Features

- Paralytic ileus is a state in which there is **failure of transmission of peristaltic waves** secondary to **neuromuscular failure**.
- The resultant stasis leads to accumulation of fluid and gas within the bowel with associated **distention**, **vomiting**, **absent** or **diminished bowel sounds** and **absolute constipation**^Q.
 - Pain is colicky in mechanical obstruction, **pain is not a feature of paralytic ileus** and if present a **steady, diffuse discomfort**^Q
- There may be an **associated feeling of emptiness** in the **right iliac fossa** (Sign of Dance)^Q
- **Occult** or **gross blood** in 60–90% of cases on rectal examination^Q
- Apex may be **palpable** or even **protrude from anus** in extensive ileocolic or colocolic intussusception^Q

Diagnosis

- **Abdominal X-ray:** Dilated bowel loops with multiple air fluid levels^Q.

- Radiological picture is similar to small bowel obstruction, the **only differentiating point** is **presence of gas in colon & rectum** in **paralytic ileus**^Q.

Paralytic Ileus	Mechanical Obstruction
<ul style="list-style-type: none"> • Pain is not a feature of paralytic ileus and if present a steady, diffuse discomfort^Q. • Bowel sounds are hypoactive or absent^Q • Presence of gas in colon & rectum^Q in paralytic ileus on abdominal X-ray 	<ul style="list-style-type: none"> • Pain is colicky^Q in mechanical obstruction • Hyperactive bowel sounds^Q in mechanical obstruction • Absence of gas in colon & rectum in mechanical (complete)^Q small bowel obstruction

76. Ans. c. Laparotomy and exploration (Ref: Bailey 26/e p1197, 25/e p1202)

- If paralytic ileus is prolonged and threatens life, a laparotomy should be considered to exclude a hidden cause and facilitate bowel decompression.

MANAGEMENT OF POST-OPERATIVE ILEUS

- The essence of treatment is **prevention**, with the use of nasogastric suction and restriction of oral intake until bowel sounds and the passage of flatus return^Q.
- **Following general principles** should be applied:
 - The **primary cause** must be **removed**^Q.
 - **Gastrointestinal distension** must be **relieved by decompression**^Q.
 - Close attention to **fluid** and **electrolyte balance**^Q is essential.
 - There is no place for the routine use of peristaltic stimulants.
- **Rarely, in resistant cases**, medical therapy with an adrenergic blocking agent in association with cholinergic stimulation, e.g. neostigmine (the Catchpole regimen)^Q, may be used, provided that an intraperitoneal cause has been excluded.

- If paralytic ileus is prolonged and threatens life, a laparotomy should be considered to exclude a hidden cause and facilitate bowel decompression^Q

77. Ans. a. Small intestine

78. Ans. d. Loops of intestine are not seen due to loss of peristalsis

79. Ans. c. Parasympathomimetics (Ref: Bailey 25/e p1202)

- **Rarely, in resistant cases**, medical therapy with an adrenergic blocking agent in association with cholinergic stimulation, e.g. neostigmine (the Catchpole regimen)^Q, may be used, provided that an intraperitoneal cause has been excluded.

80. Ans. a. No intestinal sounds heard
82. Ans. a. Small intestine

81. Ans. c. Hypokalemia

LARGE BOWEL OBSTRUCTION

83. Ans. d. Defunctioning colostomy (Ref: Sabiston 19/e p1317-1319; Bailey 26/e p1194-1196, 25/e p1202; Shackelford 7/e p1854; Maingot 11/e p501)

- Most common site of colorectal cancer is rectum, in obstructing carcinoma rectum **loop colostomy** or **defunctioning colostomy** should be done to relieve obstruction followed by **neoadjuvant chemoradiation**, with the plan to resect the primary lesion at a later time.

LARGE BOWEL OBSTRUCTION

- Classified as **dynamic (mechanical)** or **adynamic (pseudo-obstruction)**.
- Mechanical obstruction** is characterized by **blockage** of the **large bowel** (luminal, mural, or extramural), resulting in **increased intestinal contractility**^Q
- Pseudo-obstruction** is characterized by the **absence of intestinal contractility**, often associated with **decreased or absent motility** of the **small bowel** and **stomach**^Q.

- MC cause of LBO: **Colorectal cancer**^Q (CA Rectum > sigmoid)

- Adhesions (MC cause of small bowel obstruction) are rarely a cause of colonic obstruction.

Pathophysiology

- Colon becomes **distended** as **gas** (about **two thirds** is **swallowed air**, the remainder includes the products of bacterial fermentation), **stool**, and **liquid accumulate** proximal to the site of blockage.

- In **obstructed hernia** or **volvulus**, the **blood supply** can become **compromised**, or **strangulated**; initially, the **venous return** is **blocked**^Q
- Vascular compromise** of the **obstructed colon** can occur due to **excessive distention**^Q

- Closed-loop obstruction**: When **both** the **proximal** and **distal parts** of the bowel are **occluded**^Q (strangulated hernia or volvulus).

- Closed-loop obstruction** is seen when a **cancer occludes the lumen of the colon** in the **presence of a competent ileocecal valve**^Q
- Increasing colonic distention** causes the **pressure in the cecum** to become so **high** that the vessels in the bowel wall are occluded, and **necrosis** and **perforation**^Q can occur

Clinical Features

- Cancers of **rectum** or **left colon** are **more likely to obstruct**^Q than those arising in the more capacious proximal colon.
- Failure to **pass stool** and **flatus** associated with **increasing abdominal distention** and **cramping abdominal pain**^Q.

Diagnosis

- Abdominal X-ray**: **Distended colon**^Q
- CT scan**: Helpful in revealing an **inflammatory process** such as **diverticulitis**.
- Water-soluble contrast enema**: For the **diagnosis** of suspected case of **volvulus** or **distal sigmoid cancer**^Q

Treatment

- Virtually **all patients with complete acute large bowel obstruction** require **prompt surgical intervention**^Q and should not undergo a trial of non-operative management.
- Acute large bowel obstruction** in patients with **competent ileocecal valve** is a **true surgical emergency** because of **high chances of perforation** (MC site: Cecum)^Q.
- Once diagnosis has been made, **surgical exploration** should be undertaken as soon as possible after **appropriate resuscitation**^Q.

Treatment of Large Bowel Obstructionm	
Site of Obstructionm	Procedure
Right-sided colonic obstruction (cancer or volvulus)	• Resection with ileo-transverse anastomosis ^Q
Cancer of sigmoid colon	• Hartmann's operation ^Q (sigmoidectomy with descending colostomy and closure of the rectal stump), • Sigmoidectomy with primary colorectal anastomosis ^Q • Abdominal colectomy with ileorectal anastomosis ^Q
Cancer of distal or mid rectum	• Loop colostomy or defunctioning colostomy ^Q (to relieve obstruction) followed by neoadjuvant chemoradiation ^Q , (with the plan to resect the primary lesion at a later time)

84. Ans. a. Ileotransverse anastomosis after right hemicolectomy

85. Ans. a. Defunctioning colostomy

86. Ans. a. No passage of gas absolutely (Obstipation), b. No passage of stools absolutely, c. Distention of abdomen

87. Ans. d. Neoplasm

88. Ans. a. Cecum

89. Ans. b. Aganglionic colon

90. Ans. c. Early gangrene and perforation

91. Ans. d. Closed-loop obstruction and cecal perforation

- Virtually all patients with complete acute large bowel obstruction require prompt surgical intervention and should not undergo a trial of non-operative management
- Acute large bowel obstruction in patients with competent ileocecal valve is a true surgical emergency because of high chances of perforation (MC site: Cecum)^Q
- Once diagnosis has been made, surgical exploration should be undertaken as soon as possible after appropriate resuscitation^Q

	Small Bowel Obstruction	Large Bowel Obstruction
• Valvulae conniventes	Thin complete lines ^Q Seen in jejunum ^Q	Absent
• Haustra	Absent	Thick incomplete bands ^Q
• No of loops	Many ^Q	Few
• Distribution of loops	Central ^Q	Peripheral ^Q
• Diameter of loops	3–5 cm ^Q	>5 cm ^Q
• Radius of curvature	Small ^Q	Large ^Q
• Solid feces	Absent	Present ^Q

PSEUDO-OBSTRUCTION

92. Ans. c. Splenic flexure (Ref: Sabiston 19/e p1317-1318; Bailey 26/e p1197)

- radiopaedia.org/articles/colonic-pseudoobstruction
- Ogilvie's syndrome: Distended colon, with the right and transverse segments tending to be most dramatically affected. Transition point is frequently present, usually at or near the splenic flexure.

COLONIC PSEUDO-OBSTRUCTION

- Pseudo-obstruction of the colon describes the condition of distention of the colon, with signs and symptoms of colonic obstruction, in the absence of an actual physical cause of the obstruction^Q
- Acute colonic pseudo-obstruction is also known as Ogilvie's syndrome^Q
- Two types: Primary and secondary
- Secondary pseudo-obstruction is more common^Q

Pathophysiology

- Mechanism thought to play: Sympathetic overactivity overriding the parasympathetic system^Q
- Indirect support for this theory has been derived from the success in treating the syndrome with neostigmine, a parasympathomimetic agent^Q
- Further support comes from reports of immediate resolution of the syndrome after administration of an epidural anesthetic that provides sympathetic blockade

Primary pseudo-obstruction

- It is a motility disorder:
 - A familial visceral myopathy (hollow visceral myopathy syndrome) or
 - A diffuse motility disorder involving the autonomic innervation of the intestinal wall.

Causes of secondary Pseudo-obstruction

- | | |
|--|--|
| <ul style="list-style-type: none"> • Neuroleptic medications^Q • Opiates^Q • Severe metabolic illness • Myxedema (Hypothyroidism^Q) • Hyperparathyroidism^Q | <ul style="list-style-type: none"> • Uremia^Q • Lupus, scleroderma, dermatomyositis^Q • Parkinson's disease^Q • Traumatic retroperitoneal hematomas^Q • Diabetes mellitus^Q |
|--|--|

Clinical Features

- Pseudo-obstruction may present in acute or chronic forms.
- Acute form: Most commonly affects patients with chronic renal, respiratory, cerebral, or cardiovascular disease, involves only the colon^Q.
- Chronic form: Affects other parts of the gastrointestinal tract, usually presents as bouts of subacute and partial intestinal obstruction, and tends to recur periodically.

- Acute colonic pseudo-obstruction should be suspected when a medically ill patient suddenly develops abdominal distention^Q
- The abdomen is tympanitic, usually nontender, and bowel sounds are usually present

Diagnosis

- **Abdominal X-ray:** Distended colon, with the **right and transverse segments**^Q tending to be **most dramatically affected** (radiologic appearance of large bowel obstruction). **Transition point** is frequently present, usually **at or near the splenic flexure**^Q.

- **Most useful investigation:** Water-soluble contrast enema^Q
- Contrast enema differentiate mechanical obstruction and pseudo-obstruction

Treatment

- **Initial treatment:** Nasogastric decompression, replacement of extracellular fluid deficits, and correction of electrolyte abnormalities^Q.
- **All medications that inhibit bowel motility**, such as opiates, **should be discontinued**.
- **Most patients improve with this regimen**^Q.

- Treat this condition with **neostigmine**^Q
- **Mechanical obstruction should be excluded** (either by water-soluble contrast enema or colonoscopy) **before** the administration of **neostigmine**^Q
- **Resolution** is indicated by the **passage of stool and flatus** by the patient, **within ten minutes** of drug administration

93. Ans. a. It is caused by mechanical obstruction of the colon 94. Ans. a. Water soluble contrast enema
 95. Ans. d. Hyperthyroidism 96. Ans. c. Intestinal pseudo-obstruction
 97. Ans. c. Ogilvie's syndrome

VOLVULUS

98. Ans. c. Rigid sigmoidoscopy is the initial treatment (Ref: Sabiston 19/e p1314-1315; Schwartz 10/e p1219-1220, 9/e p1055; Bailey 26/e p1188, 1190, 1195, 25/e p1194, 1196, 1200; Shackelford 7/e p1850-1853)

SIGMOID VOLVULUS

- Volvulus can occur in any segment of large bowel attached to a **long and floppy mesentery**^Q or fixed to the retroperitoneum by a **narrow base of origin**^Q

- **MC site of volvulus:** Sigmoid colon
- **More commonly anticlockwise** (can be both clockwise or anticlockwise)

- Equal frequency in both sexes^Q

Associated predisposing factors

- Age: 60–70 years^Q.
- Chronic constipation^Q
- **Institutionalized or neurologically impaired or psychiatric patients**^Q (their medication may decrease intestinal motility, or they may fail to pass stool regularly, leading to fecal loaded large bowel predisposing to volvulus)
- Diet high in fibre and vegetables^Q (as in third world countries)

Clinical Features

- Present as **acute or subacute intestinal obstruction**
- **Sudden onset of severe abdominal pain, vomiting, and obstipation**.
- Abdomen is **markedly distended and tympanitic**, with the **distention often more dramatic**^Q than would be associated with other causes of obstruction.
- Severe abdominal pain, **rebound tenderness**, and **tachycardia** are **ominous signs**^Q.

Radiological (X-ray) Characteristics

- **Markedly dilated sigmoid colon** with the **appearance of a bent inner tube** or **coffee bean appearance**^Q.
- **Inferior convergence** of the dilated loop **points towards left side** of pelvis. Whorl sign CT scan.

- **Contrast enema** demonstrates the **point of obstruction** with the pathognomic '**birds beak**' or '**bird of prey**' or '**ace of spades**' sign^Q

Management of sigmoid volvulus

- **Initial management:** Resuscitation^Q followed by **endoscopic decompression** and **detorsion**^Q.
- **Decompression/detorsion**^Q can be achieved by placement of **rectal tube** through a **proctoscope** or the use of a **colonoscope**.
- If detorsion/decompression cannot be achieved with either the rectal tube or colonoscope, **laparotomy with resections of the sigmoid colon**^Q is done.

- Even if **detorsion** of the sigmoid volvulus is successful, **risk of recurrence is high (50%)**^Q
- **Sigmoid colectomy** is indicated after the patient has stabilized

- Any evidence of **bowel gangrene** or **perforation** contraindicates **non-operative decompression** and an **immediate surgical exploration**^Q is done.

99. Ans. a. Sigmoid colon

100. Ans. c. Ogilvie's syndrome refers to cecal volvulus (Ref: Sabiston 19/e p1315-1316; Schwartz 10/e p1219, 9/e p1055; Bailey 26/e p1188, 1190, 1195, 25/e p1194, 1196, 1200; Shackelford 7/e p1853-1854)

- Acute colonic pseudo-obstruction is also known as Ogilvie's syndrome.

CECAL VOLVULUS

- Cecal volvulus is **actually a cecocolic volvulus**^Q
- Consists of an **axial rotation** of the **terminal ileum, cecum, and ascending colon**^Q with concomitant twisting of the associated mesentery.
- **Cause: Lack of fixation of the cecum to the retroperitoneum.**^Q

- Cecal volvulus occurs in **clockwise direction**^Q
- **More common in women**^Q
- Affects a **younger age group** as compared to sigmoid volvulus, in **5th decade**^Q

Predisposing Factors for Cecal volvulus

- | | |
|--|---|
| • Previous surgery ^Q | • Malrotation ^Q |
| • Pregnancy ^Q | • Obstructing lesions of the left colon ^Q |

Clinical Features

- Sudden onset of **abdominal pain** and **distention**.
- Presents with **features of small bowel obstruction**.
- **Asymmetric distention** of the abdomen, with a **tympanitic mass palpable** in either the **left upper quadrant** or **midabdomen**^Q.

Diagnosis

- **Abdominal X-ray: Dilated cecum, displaced to the left side** of the abdomen.
- **Distended cecum** assumes a **gas-filled comma shape** or **kidney bean shape**^Q, the **concavity** of which faces **inferiorly** and to the **right**.
- **Haustral markings** in the **distended loop** indicate that the dilated bowel is colon.
- **Torsion results in small bowel obstruction**^Q (radiographic pattern of SBO)

- **Contrast enema** is used to **confirm the diagnosis** and to **exclude a carcinoma of the distal bowel** as a **precipitating cause** of the volvulus^Q

Treatment

- **Most cases require operation to correct the volvulus and prevent ischemia**^Q.
- If **ischemia** has already occurred, **immediate operation** is obviously required.

- **Right colectomy with primary anastomosis** is the **procedure of choice**^Q
- In **frankly gangrenous bowel**, **resection of the gangrenous bowel with ileostomy** is a **safar approach**

- **Recurrence rates are high with cecopexy**, and **right colectomy** remains the **procedure of choice for cecal volvulus**.

Cecal bascule

- A condition in which **cecum folds in a cephalad direction anteriorly** over a **fixed ascending colon**^Q
- Cecal bascule **commonly causes intermittent bouts of abdominal pain**
- Mobile cecum permits **intermittent episodes of isolated cecal obstruction** that are **spontaneously relieved**^Q as the cecum falls back into its normal position

101. Ans. d. Cecopexy can be a form of treatment

102. Ans. b. Right hemicolectomy is the treatment of choice

103. Ans. d. Midgut volvulus

104. Ans. c. Sigmoid volvulus

105. Ans. b. Common in psychiatric patients, c. Bird's beak sign, d. May present as intestinal obstruction

106. Ans. a. Mostly resolve with colonoscopic reduction

107. Ans. c. Lower GI scopy is contraindicated in sigmoid d. Volvulus of cecum is managed by conservative methods

108. Ans. a. Volvulus

109. Ans. b. Colectomy

110. Ans. d. Loaded pelvic colon

111. Ans. d. Either clockwise or anticlockwise

112. Ans. c. Both clockwise and anti-clockwise

- Sigmoid volvulus is **more commonly anticlockwise** (can be **both clockwise or anticlockwise**)^Q
- Cecal volvulus and small intestine volvulus are mostly **clockwise**^Q

113. Ans. b. Non-operative treatment has no role

114. Ans. d. Tuberculosis (Ref: Schwartz 9/e p1055)

- Hirschprung's disease and Chagas disease can lead to megacolon, a risk factor for sigmoid volvulus.

115. Ans. b. Large bowel volvulus

- Small bowel volvulus is most common form of volvulus in neonates. Colonic volvulus is very rare.

MALROTATION

116. Ans. b. Malrotation (Ref: Sabiston 19/e p1843-1844; Schwartz 10/e p1616-1617, 9/e p1428-1429; Shackelford 7/e p1046-1048; Bailey 26/e p119)

MALROTATION

- Patients have a 30–62% risk of having associated anomalies, and most involve GIT^Q.
- Incidence of clinically symptomatic malrotation is 1 in 6000 live births^Q.
- Malrotation may initially be recognized at any age

- Approximately in 90% of patients symptoms develop before 1 year of age, with 50% to 75% appearing within the first month^Q of life.

Clinical Features

- Malrotation can be totally asymptomatic and discovered only during work-up for an unrelated condition or during an autopsy examination.
- Malrotation without volvulus may be manifested as chronic, vague abdominal pain, with or without intermittent bilious emesis, and failure to thrive^Q.

- Neonates typically have bilious emesis, which may be the only initial symptom of midgut volvulus^Q.
- Systemic signs such as increasing lethargy with poor perfusion, temperature instability, cardiopulmonary compromise, and low urine output in cases of delayed diagnosis^Q.

- Hematologic studies may show metabolic acidosis, thrombocytopenia, and leukopenia.
- The acute onset of bilious vomiting in a neonate is a sign of malrotation until proved otherwise. It demands immediate radiologic evaluation^Q.

Diagnosis

Upper Gastrointestinal Contrast Study

- The gold standard test for the diagnosis is an upper gastrointestinal contrast study^Q.
- Malrotation is diagnosed by an abnormal position of the ligament of Treitz^Q.
- The normal location is typically to the left of the vertebral column and posterior to the stomach^Q.

- Volvulus can be diagnosed by contrast-enhanced upper gastrointestinal series showing a corkscrew configuration of the upper portion of the small intestine or a "bird's beak" appearance at the third portion^Q of the duodenum.

Treatment

Acutely ill child with peritonitis	Emergency surgery ^Q without radiologic studies
Symptomatic from volvulus	Nasogastric decompression, intravenous fluid, and broad-spectrum antibiotics followed by urgent surgery ^Q
Chronic symptoms or symptom-free	Elective correction ^Q

In Malrotation

- Plain abdominal radiographs are not helpful in ruling in or out midgut volvulus^Q.
- A contrast enema study is not part of the work-up for malrotation. The presence of a normally located cecum in the right lower quadrant does not rule out malrotation^Q.

Operative Treatment of Malrotation

- The standard approach via a right upper quadrant transverse incision^Q.
- If volvulus is present, it should be reduced by counterclockwise rotation^Q as necessary because volvulus usually occurs in a clockwise direction.

- Bowel with uncertain viability should be wrapped with warm moist gauze sponges for at least 15 minutes.

- Frankly gangrenous bowel should be resected and a stoma or stomas fashioned.
- Ladd's bands, which represent the posterior peritoneal attachments of the right colon that cross over the duodenum, should be divided on the lateral aspect of the duodenum^Q.

- Widening of the mesenteric base is necessary, and the duodenum is mobilized and straightened by dividing the abnormal ligament of Treitz and Ladd's bands.

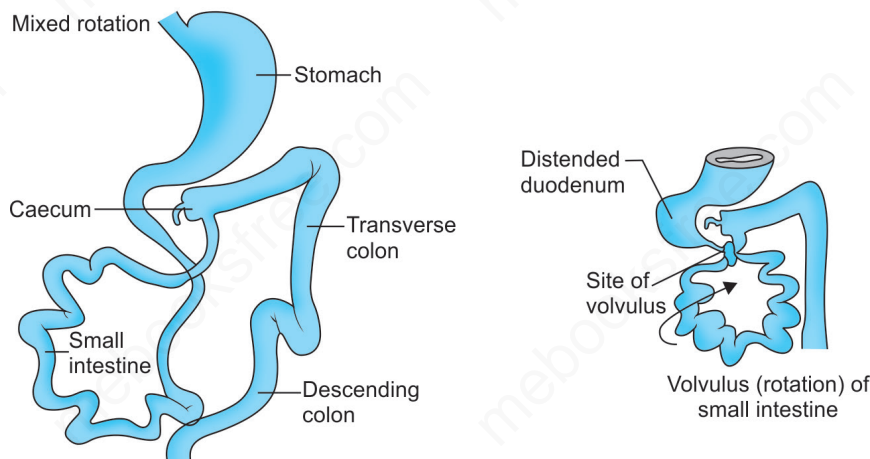
- Incidental appendectomy should be performed to avoid diagnostic confusion in the future because the cecum will be placed in the left lower quadrant^Q.

- Duodenum and proximal jejunum are placed on the right side^Q
- Terminal ileum and cecum are placed in the left hypochondrium^Q

117. Ans. d. Mixed rotation (Ref: Sabiston 19/e p1843-144; Schwartz 9/e p1428-1429; Shackelford 7/e p1046-1048)

Mixed rotation of gut:

- The intestine doesn't rotate as it re-enters the abdomen after physiological hernia.
- **Caecum lies just inferior to the pylorus of the stomach.** It may result in volvulus (twisting) of intestine, which leads to obstruction further.



MALROTATION: EMBRYOLOGY

- **Rapid growth plus elongation** of the **midgut** starting in the **fifth week** leads to **herniation** of the midgut with the **superior mesenteric vessels** as its stalk^Q.
- The midgut undergoes **270-degree counterclockwise rotation**^Q around the superior mesenteric vessels.
- This **initial rotation** results in the **normal position** of the **DJ flexure** in the **left upper quadrant** at the level of the gastric antrum^Q.
- The **DJ flexure** becomes **fixed** to the **posterior abdominal wall** by the **ligament of Treitz**. As a result of this rotation and fixation, the **third portion** of the **duodenum** lies **posterior** to the **SMA**^Q.

- In the **10th week** the **herniated intestinal loop** begins to **return**^Q to the abdominal cavity.
- The **cecocolic loop** undergoes another **270-degree counterclockwise rotation**^Q around the **SMA**, which leads to the **normal position** of the **cecum** in the **right lower quadrant**.

- Subsequently, the ascending colon and descending colon become fixed to the posterior abdominal wall.
- During the **fourth and fifth weeks** of gestation, the **small intestine mesentery** attaches itself to the **posterior abdominal wall** in a broad base **extending** diagonally from the **DJ flexure** to the **cecum**^Q.

- **MC rotational abnormality: Non-rotation**^Q
- **MC type of malrotation: Incomplete rotation**^Q

TYPES OF MALROTATION

Non-rotation

- MC rotational abnormality
- **Failure of counterclockwise rotation**^Q after return of the midgut to the abdominal cavity.
- **Duodenal 'C' loop**, **ligament of Treitz** and **small intestine** is on **right side** of abdomen.
- **Cecum** is on the **left side** of abdomen^Q
- The **proximal jejunum** and **ascending colon** are **fused** as **one pedicle**, through which **blood supply** to the **entire midgut (SMA)** is located.

Incomplete rotation

- The **counterclockwise rotation** is **arrested** at around **180 degrees**^Q.
- **Most common**^Q forms of malrotation.

- The **small intestine** lies on the **right side** with the **DJ flexure** to the **right** of the **vertebral column**, and the **duodenum** has a **corkscrew configuration**^Q.
- The **large intestine** lies on the **left side** with the **cecum** at **abnormal locations**, usually in the **midline**^Q.

- Other forms of fixation anomalies may be due to **failure of fixation** of the **ascending colon** in the **right hypochondrium**. Associated with this abnormal fixation is a **narrow intestinal mesentery** and **Ladd's bands**.
- **Ladd's bands** represent the **retroperitoneal attachments** that normally **fix** the **cecum** and **ascending colon** to the **posterior abdominal wall**. Because the right colon is more medial, the **bands extend across** the **duodenum** from the right upper quadrant to the **cecum** and **ascending colon**^Q.

Reverse rotation

- In **reverse rotation**, part of the **rotation** occurs in a **clockwise direction** around the SMA.
- The **duodenum** assumes an **anterior position** and the **colon lies posterior** to the duodenum and the SMA.

Hyper-rotation

- If the **counterclockwise rotation** extends **beyond 270 degrees**, the **cecum** comes to rest in the **left hypochondrium position**.

118. Ans. b. Bleeding PR, c. Bilious vomiting

MISCELLANEOUS

119. Ans. a. Rectouterine pouch

120. Ans. a. Porphyria (Ref: Harrison 18/e p3173)

SPASTIC ILEUS

- Spastic ileus or dynamic ileus is rare, results from extreme and prolonged contraction of the intestine.

Spastic ileus is seen in	
• Heavy metal poisoning ^Q	• Porphyria ^Q
• Uremia ^Q	• Extensive intestinal ulceration ^Q

121. Ans. a. It is poorly localized (Ref: Guyton 11/e p603-604; Ganong 23rd/169-170)

CHARACTERISTIC FEATURES VISCERAL PAIN

- Visceral pain is **poorly localized**, often the pain is **referred** or **radiating**^Q
 - **Highly localized** types of **damage** to the viscera **seldom cause severe pain**
 - Often accompanied by **vomiting** and **hypotension**^Q
- **Pain of hollow viscus** is often **felt as a colic**^Q (it comes and goes to reappear again).
- There are **no proprioceptors in viscera** and few temperature and touch sense organs. Pain receptors are present, although they are more sparsely distributed than in somatic structures.
 - **Afferent fibers** from visceral structures **reach the CNS via sympathetic and parasympathetic pathways**.
 - Their **cell bodies** are located in the **dorsal roots** and the **homologous cranial nerve ganglia**.
 - Specifically, there are **visceral afferents** in the **facial, glossopharyngeal, and vagus nerves**; in the thoracic and upper lumbar dorsal roots; and in the sacral roots.
- Essentially **all visceral pain** that originates in the **thoracic and abdominal cavities** is transmitted through **small type C pain fibers** and, therefore, can transmit only the chronic-aching-suffering type of pain

122. Ans. d. Ischemic bowel disease (Ref: Sabiston 19/e p1177; Schwartz 9/e p730-736; Bailey 25/e p1202-1203; Shackelford 7/e p1077-1082)

- In **ischemic bowel disease** or **mesenteric ischemia**, **vascularity of adjoining mesentery** is decreased.
- *History of abdominal pain and altered bowel habits with thickened cecum and ileocecal junction and increased vascularity of surrounding mesentery can be observed in Ulcerative colitis, Crohn's disease and tuberculosis.*

Mesenteric Ischemia

- Findings on CT scans associated with **bowel ischemia** include **dilation of the bowel lumen, bowel wall thickening, abnormal bowel wall enhancement, arterial occlusion, venous thrombosis, and intramural or portal venous gas**^Q.
- **Dilation of an ischemic bowel segment** suggests **interruption of normal peristaltic activity**^Q.
- **Symmetrical bowel wall thickening greater than 3 mm** in a **distended segment**^Q of bowel suggests ischemia.
- Greater degrees of bowel wall thickening should raise suspicion of mesenteric venous thrombosis (MVT).
- **Intravenous contrast** is useful in demonstrating the heterogeneity of the ischemic bowel wall (**lack of bowel wall enhancement**) and may show **occlusion of mesenteric arteries** if given by **rapid bolus administration**^Q.

Small Intestine

MULTIPLE CHOICE QUESTIONS

MECKEL'S DIVERTICULUM

- All are true statement about Meckel's diverticulum except:**
(Recent Question 2014; PGI Nov 2010)
 - Occurs in 2% of population
 - Perforation occurs
 - Common on anti-mesenteric border
 - Contains ectopic gastric tissue
 - Diarrhea very common
- Ectopic mucosa of Meckel's diverticulum is diagnosed by:**
(AIIMS GIS Dec 2011, Dec 2010)
 - Tc-99 radionuclide scan
 - Angiography
 - CT
 - Endoscopy
- All are true about Meckel's diverticulum except:**
(GB Pant 2011)
 - Congenital
 - True diverticula
 - Develop from omphalomesenteric duct
 - All incidentally detected Meckel's diverticulum should be resected
- Ectopic gastric mucosa is best diagnosed with:**
(GB Pant 2011)
 - Scintigraphy
 - CT
 - USG
 - MRI
- Most common presenting complication of Meckel's diverticulum:**
(Orissa 2011)
 - Hemorrhage
 - Intussusception
 - Meckel's diverticulitis
 - Intestinal obstruction
- Meckel's diverticulum is a derivative of:**
(All India 94, AIIMS May 2005)
 - Allantoic diverticulum
 - Vitelointestinal duct
 - Ventral mesogastrium
 - Ductus arteriosus
- The most frequent congenital anomaly of the GI tract is:**
(PGI 80, AIIMS 80, 81)
 - Imperforate anus
 - Meckel's diverticulum
 - Malrotation
 - Duodenal atresia
- All of the following are true about Meckel's diverticulum except:**
(All India 96)
 - Bleeding
 - Intussusception
 - Arises at the mesenteric border
 - Located 60 cm from the cecal valve
- Which one of the following statements is incorrect regarding Meckel's diverticulum?**
(Recent Question 2015)
 - Is found on the anti-mesenteric border of the small intestine
 - Consists of mucosa without a muscle coat
 - Heterotopic gastric mucosa can ulcerate and cause a brisk gastrointestinal bleed
 - A fibrous band between the apex and umbilicus can cause intestinal obstruction
- Best investigation for diagnosis of ectopic gastric mucosa in Meckel's diverticulum:**
(AIIMS June 99)
 - Fluoroscopy
 - Occult blood test in stool
 - Ultrasound abdomen
 - Radionuclide scan
- A wide mouthed Meckel's diverticulum is found accidentally on laparotomy. What will be the treatment of choice?**
 - Resection of diverticulum
 - Leave as such
 - Ligate at base
 - Resection with part of ileum
- Meckel's diverticulum, true are all except:**
(PGI June 2006)
 - Has three layers with artery
 - Heterotopic epithelium in 50-60% cases
 - Always gastric epithelium
 - May present with hemorrhage
 - When accidentally seen in laparotomy always resected
- True about Meckel's diverticulum is/are:**
(PGI June 2001)
 - Bleeding PR
 - Can be a leading point of intussusception
 - Multiple diverticuli common
 - Visualized best by barium meal
 - Almost never requires active treatment
- Which is true regarding site of Meckel's diverticulum?**
(PGI June 95)
 - 2 feet proximal to ileocecal valve on mesenteric border
 - 2 feet distal to duodenojejunal flexure on antimesenteric border
 - 2 feet distal to D-3 flexure on mesenteric border
 - 2 feet proximal to ileocecal valve on antimesenteric border
- Complications of Meckel's diverticulum include:**
(Kerala 86)
 - Hemorrhage
 - Intussusception
 - Strangulation
 - All are correct
- The commonest presentation of Meckel's diverticulum is:**
 - Bleeding
 - Obstruction (All India 91)
 - Diverticulitis
 - Intussusception
- Which one of the following conditions is diagnosed by Tc⁹⁹-Pertechnate scintigraphy?**
(UPSC 2004)
 - Pharyngeal diverticulum
 - Duodenal diverticulum
 - Meckel's diverticulum
 - Colonic diverticulum
- Meckel's diverticulum is remnant of:**
(UPPG 2007)
 - Vitello intestinal duct
 - Urachus
 - Oganic diaphragm
 - None

19. The Meckel's diverticulum is situated within about _____ cm from the ileocecal valve: (COMEDK 2008, 2007)
 a. 25 b. 60
 c. 75 d. 100
20. Most common presentation of Meckel's diverticulum? (APPG 2008)
 a. Lower GI bleeding b. Upper GI bleeding
 c. Diarrhea d. Abdominal pain
21. Which of the following statement is not true about Meckel's diverticulum? (DPG 2007)
 a. Most common congenital anomaly of small intestine
 b. Most common is ectopic gastric mucosa
 c. Bleeding may occur from the wall
 d. Wide mouth stapling at the base for non bleeding cases
22. Most common presentation of Meckel's diverticulum? (APPG 2008)
 a. Lower GI bleeding b. Upper GI bleeding
 c. Diarrhea d. Abdominal pain
23. Uncommon complication of Meckel's diverticulum: (MCI Sept 2005)
 a. Intussusception b. Diverticulitis
 c. Malignancy d. Increased bleeding
24. Common congenital anomaly of midgut is: (COMEDK 2008)
 a. Hirschsprung's disease b. Omphalocele
 c. Duodenal atresia d. Meckel's diverticulum
25. Efficacy of Tc-Pertechnate scan is increased by all except: (AIIMS GIS Dec 2006)
 a. Glucagon b. Pentagastrin
 c. Cimetidine d. Metoclopramide
26. What is false about Meckel's diverticulitis? (AIIMS November 2015)
 a. Present in 3% of the population
 b. Presents with periumbilical pain
 c. Remnant of proximal part of vitelointestinal duct
 d. Lies on the anti-mesenteric border

SMALL INTESTINAL DIVERTICULA

27. True about small bowel diverticula: (PGI June 2005)
 a. Contains all the layers of bowel wall
 b. Common in terminal ileum
 c. Surgical treatment is not required
 d. Seen on the mesenteric border
28. All are true about duodenal diverticula except: (AIIMS GIS May 2011)
 a. Whenever found, should be treated due to increased risk of complications
 b. Most common site is periumbilly region
 c. Can cause acute pancreatitis
 d. Most are asymptomatic
29. Feature(s) of Jejunal diverticula is/are: (PGI Nov 2010)
 a. ↑ Folate absorption b. ↓ Ferritin absorption
 c. ↓ B12 absorption d. Urea breath test
 e. Steatorrhea

GASTROINTESTINAL TUBERCULOSIS

30. Which one is not true regarding hyperplastic ileocecal tuberculosis? (AIIMS June 97, All India 2001)
 a. Mass in right iliac fossa
 b. Common site ileocecal region
 c. X-ray shows indrawing of caecum from ileum
 d. Conservative management is treatment of choice
31. Which is true about intestinal tuberculosis?
 a. Common site is appendix (PGI Dec 99, PGI June 96)
 b. Causes intestinal perforation
 c. Commonly associated with pulmonary TB
 d. Caused by M. tuberculosis
32. Small intestinal tuberculosis can cause: (PGI 88)
 a. Diarrhea b. Constipation
 c. Structure d. Malabsorption
33. Most common indication for laparotomy in intestine TB is: (PGI 93)
 a. Peritonitis
 b. Intestine obstruction
 c. Doubtful diagnosis
 d. Lower GI bleeding
34. Not true about hyperplastic tuberculosis: (UPPG 2000)
 a. Most common site is ileo-cecal region
 b. Presents as mass in right iliac fossa
 c. Surgery is the treatment of choice
 d. Barium studies are characteristic
35. Most common indication for operation in tuberculosis of intestine is: (Kerala 2001)
 a. Obstruction b. Perforation
 c. Mass abdomen d. GI symptoms
36. Commonest site of tuberculosis of the intestines:
 a. Stomach b. Ileum (All India 89)
 c. Jejunum d. Colon
37. Commonest site involved in ileocecal TB:
 a. Intestinal wall b. Lymph node
 c. Mesentery d. Intestinal mucosa
38. True regarding barium study of ileocecal tuberculosis: (PGI June 2009)
 a. String sign b. Goose neck sign
 c. Right sided obstruction d. Pulled up caecum
 e. Sterlein sign
39. The most common cause of perforation of the distal ileum in India is: (UPSC 2005)
 a. Tuberculosis b. Typhoid
 c. Amoebiasis d. Regional enteritis
40. Pulled up cecum is seen in: (Recent Question 2014, 2013)
 a. CA colon
 b. Carcinoid
 c. Ileocecal tuberculosis
 d. Crohn's disease
41. Fleischner sign on barium study is seen in? (DNB 2014)
 a. Ileocecal TB b. Crohn's disease
 c. Small bowel carcinoid d. Typhoid

SUPERIOR MESENTERIC ARTERY SYNDROME

42. All are true regarding superior mesenteric artery syndrome, except: (All India 2000)
 a. Caused by compression of distended duodenum
 b. Common in young females
 c. Does not occur in obese individuals
 d. Most common in 6th-7th decade
43. What is probable diagnosis of a patient with spinal POP cast presenting with bilious vomiting?
 a. Acute dilation of stomach
 b. Duodenal obstruction
 c. Peritonitis
 d. Acute pancreatitis

44. All of the following is true regarding superior mesenteric artery syndrome, except: (MHSSMCET 2008)
- Common in young females
 - Caused by compression of third part of duodenum
 - Vomiting and post-prandial abdominal pain are typical symptoms
 - Gastrojejunostomy is treatment of choice in chronic cases

PNEUMATOSIS INTESTINALIS

45. A young, apparently healthy patient presented with air under bilateral domes of diaphragm, which is because of:
- Pneumatosis cystoides intestinalis (GB PANT 2011)
 - Diverticulitis
 - Perforated peptic ulcer
 - Band with Meckel's diverticulum
46. Treatment of choice for pneumatosis intestinalis, which is uncomplicated: (MHPGMCET 2007)
- High flow oxygen therapy
 - Steroids and antibiotics
 - Surgical resection
 - Sulfasalazine therapy
47. Pneumatosis intestinalis in plain abdominal Roentgenogram is seen in: (Orissa 2011)
- Meconium ileus
 - Neonatal necrotizing enterocolitis
 - Duodenal atresia
 - Intestinal obstruction
48. All are correct regarding pneumatosis cystoides except one:
- Spontaneous regression is seen (AIIMS June 95)
 - Surgical resection indicated
 - May cause tension pneumoperitoneum
 - May cause severe bleeding
49. When the gas filled cysts are found in subserosa or submucosa of small intestine or colon, it is called:
- Pneumatosis cystoides intestinalis (AMU 2005)
 - Colonoscopy
 - Double contrast barium enema
 - Mesenteric cyst
50. Pneumatosis intestinalis is diagnostic of: (COMEDK 2009)
- Ileal perforation
 - Necrotizing enterocolitis
 - Meconium ileus
 - Colonic aganglionosis

SHORT BOWEL SYNDROME

51. Which one of the following gastrointestinal disorders predisposes to urolithiasis? (UPSC 2007)
- Peutz-Jegher's syndrome
 - Short bowel syndrome
 - Familial polyposis coli
 - Ulcerative colitis
52. Which is not seen in massive resection of small bowel? (AIIMS June 95, All India 98, PGI June 99, DPG 2008)
- Hypogastrinemia
 - Vitamin B12 deficiency
 - Malabsorption
 - Oxalate stone
53. Complications of short bowel syndrome: (GB Pant 2011)
- Gall stones
 - Oxalate renal stones
 - Cirrhosis
 - All of the above
54. Deficiency of which of the following vitamin is most commonly seen in short bowel syndrome with ileal resection? (DNB 2012, All India 2012)
- Vitamin B12
 - Vitamin B1
 - Folic acid
 - Vitamin K

55. Renal calculus is seen in massive bowel resection due to: (AIIMS Nov 94)
- Reduced renal calcium excretion
 - More calcium absorption in gut
 - More oxalate absorption in gut
 - None of the above

56. Resection of 90% of the ileum and jejunum causes all the following except: (All India 94)
- Hypogastrinemia
 - Steatorrhea
 - Anemia
 - Extracellular volume depletion

RADIATION ENTERITIS

57. Multiple structures in intestine are found in: (All India 2000)
- Radiation enteritis
 - Duodenal ulcer
 - Ulcerative colitis
 - Gastric erosion
58. Dose of radiation causing small intestinal radiation enteritis: (AIIMS GIS Dec 2006)
- 2300 rad
 - 5000 rad
 - 5500 rad
 - 6000 rad
59. Intestine can tolerate a maximum dose of radiation upto: (ILBS 2011)
- 3000 rad
 - 4000 rad
 - 5000 rad
 - 6000 rad

ENTERIC FEVER

60. Typhoid perforation occurs during: (MHSSMCET 2005, MHPGMCET 2006, UPPG 2009, AIIMS 89)
- 1st week
 - 2nd week
 - 3rd week
 - 4th week
61. A 14-years old girl with history of prolonged fever and abdominal discomfort is observed to have splenomegaly and leucopenia. In the course of disease she developed acute abdominal event and died. Which of the following is the likely finding on autopsy? (All India 2012)
- Transverse ulcers
 - Longitudinal ulcers
 - Pin point ulcers
 - Pseudopolyps
62. Typhoid perforation is diagnosed by: (AIIMS 81)
- Plain X-ray of abdomen in erect posture
 - Rectal examination
 - Gastric aspiration
 - Barium enema
63. A 24-years old male, who has been having fever for 15 days starts having acute pain and distension of abdomen. Abdominal examination reveals generalized tenderness with guarding. The most likely diagnosis is: (UPSC 88)
- Acute appendicitis
 - Acute pancreatitis
 - Enteric perforation
 - Duodenal ulcer perforation

SMALL BOWEL RESECTION AND ANASTOMOSIS

64. Anastomosis of small bowel is done by: (J and K 95)
- Suture in 1 layer by non-absorbable suture
 - Suture in 2 layers by non-absorbable suture
 - Suture in 2 layers by absorbable sutures
 - Suture in layers by absorbable suture

65. Treatment of choice in multiple intestinal strictures of segment of Jejunum is: (AIIMS 92)
- Resection and end to end anastomosis
 - Nobles procedure
 - Strictureplasty
 - End to side anastomosis

ENTERIC FISTULA

66. All are associated with non-healing of fistula except: (GB PANT 2011)
- Contained abscess
 - Distal obstruction
 - Non-epithelialization
 - Radiating enteritis
67. Causes of non-healing of enterocutaneous fistula are all except: (AIIMS GIS May 2011)
- Epithelialization of track
 - Radiation enteritis
 - Acute inflammatory disease
 - Track length >3 cm
68. Favorable features for closure of enterocutaneous fistula are all except: (AIIMS GIS Dec 2011)
- Tract <1 cm
 - No sepsis
 - No underlying bowel disease
 - No distal obstruction
69. All of the following delay healing of enterocutaneous fistula except: (JIPMER GIS 2011)
- Radiation
 - Foreign body
 - >2 cm fistulous tract
 - High output
70. Fistula leading to highest electrolyte in balance is: (DNB 2009)
- Gastric
 - Duodenal
 - Sigmoid
 - Rectal

INTESTINAL ATRESIA AND DUPLICATION

71. A neonate presented with bilious vomiting and X-ray showing disproportionate size of bowel loops with no air-fluid levels. Most likely diagnosis is: (KGMU 2011)
- Intestinal atresia
 - Midgut volvulus
 - Meconium ileus
 - Meconium plug syndrome
72. Most common site of intestinal duplication: (PGI SS June 2001)
- Duodenum
 - Jejunum
 - Ileum
 - Colon
73. Commonest cause of intestinal obstruction in neonate is: (MHPGMCET 2001)
- Meconium ileus
 - Intestinal atresia
 - Hirschsprung's disease
 - Volvulus
74. True about duplication of intestine is: (PGI June 98)
- Spherical type is MC
 - Tubular type is attached longitudinally with bowel
 - Spherical cyst communicates with lumen
 - All of the above
75. Commonest site of intestinal atresia is in the: (KGMU 2011, APPG 86, PGI 86, NIMHANS 86, PGI 85, UPSC 87)
- Duodenum
 - Jejunum
 - Ileum
 - Colon

76. The treatment of choice in duodenal atresia: (All India 89)
- Gastrojejunostomy
 - Duodenojejunostomy
 - Bishop koop procedure
 - Duodenoduodenostomy
77. "Apple peel bowel with loss of dorsal mesentery is feature of which type of ileal atresia?
- Type 1
 - Type 2
 - Type 3
 - Type 4

NEOPLASMS OF SMALL INTESTINE

78. Most common tumor of small bowel in children: (GB PANT 2011)
- Lymphoma
 - Carcinoma
 - Leiomyosarcoma
 - Adenocarcinoma
79. In small intestinal malignancy: (PGI SS June 2009, June 2006)
- Most common site is jejunum
 - Most common site is ileum
 - Most common type is adenocarcinoma
 - Less common due to decreased intestinal transit and increased enzymatic action
80. Most common malignancy of small bowel: (PGI SS 2004)
- Adenocarcinoma
 - Carcinoid tumors
 - Lymphoma
 - Papilloma
81. Commonest tumor of small intestine is: (All India 96, AIIMS Feb, 97, PGI June 95)
- Leiomyoma
 - Lymphoma
 - Adenocarcinoma
 - Hemangioma
82. True about small bowel tumour: (PGI June 2003)
- Commonly located in duodenum
 - Lymphoma is common
 - Adenocarcinoma has good prognosis
 - Palliative surgeries are done even in presence of metastasis
 - Adjuvant chemotherapy is given
83. Investigation of choice for small intestine tumor: (JIPMER 98)
- Ba meal follow through
 - Echo
 - X-ray abdomen
 - CT scan with contrast
84. True about duodenal adenocarcinoma: (PGI 2004)
- Commonest small intestinal tumor
 - Arises from periampullary region
 - Jaundice and anaemia found
 - 5-years survival is 5%
 - Surgery is only curative
85. True about abdominal lymphoma: (PGI Nov 2011)
- GIT lymphoma-most commonly has polypoid appearance
 - Primary small-intestinal lymphomas are most commonly located in the ileum
 - Lymphoma is most common primary malignant neoplasm of spleen
 - Stomach is most common site for extranodal lymphoma
 - MALT lymphoma is associated with H. pylori infection
86. Most common primary for small bowel metastasis: (AIIMS GIS May 2011)
- Lungs
 - Melanoma
 - Breast
 - Kidney
87. False statement regarding benign small bowel tumour is:
- Accidentally discovered during surgeries (JIPMER 2013)
 - Most commonly asymptomatic
 - Cause hemorrhage
 - Causes malabsorption

CARCINOID TUMORS

88. All are true about carcinoid tumors except: (GB PANT 2011)
 a. Small bowel is the least common site
 b. Multifocal in 30% cases
 c. Associated with synchronous adenocarcinoma
 d. Associated with MEN-1 in 10% cases
89. All of the following statements about carcinoid tumors are true except: (All India 2012)
 a. It is the most common malignant tumor of the small intestine
 b. Extensive involvement of small intestine is associated with higher probability of lung metastasis
 c. Five year survival for carcinoids tumors is > 60%
 d. Appendiceal carcinoids are more common in females
90. Least common vulvular disease in carcinoids is:
 a. TS b. TR (JIPMER GIS 2011)
 c. PR d. PS
91. All are seen in carcinoid syndrome except: (HPU 2005)
 a. Diarrhea b. Constipation
 c. Liver metastasis d. 5-HT secretion
92. The metabolite excreted in the urine carcinoid syndrome is: (MHCET 2016)
 a. VMA b. 17-Ketosteroid
 c. Histamine d. 5-HIAA
93. All of the following are associated with carcinoid syndrome except: (MCI Sept 2005)
 a. Cyanosis b. Diarrhea
 c. Flushing d. Acute appendicitis
94. All of the following about gastrointestinal carcinoid tumors are true, except: (All India 2010)
 a. Small intestine and appendix account for almost 60% of all gastrointestinal carcinoid
 b. Rectum is spared
 c. 5-years survival for carcinoid tumors is >60%
 d. Appendiceal carcinoids are more common in females than males
95. True about carcinoid syndrome: (PGI Nov 2011)
 a. Associated with MEN-1
 b. Serum chromogranin-A is elevated
 c. Urinary excretion of 5-HIAA is increased
 d. Urinary excretion of 5-HIAA is decreased
 e. Octreotide is used for treatment
96. False about carcinoid syndrome: (PGI May 2011)
 a. Foregut carcinoid-↑serotonin in blood
 b. Midgut carcinoid-↑serotonin in blood
 c. Foregut carcinoid-↑serotonin in blood
 d. Midgut carcinoid-normal urinary 5-HIAA
97. Which of the following is true of small bowel carcinoids?
 a. Most common site is duodenum (AIIMS Nov 2006)
 b. It does not cause endocardial fibroelastosis
 c. Increased risk of CA lung
 d. It is the most common malignancy of small intestine
98. Most common site for carcinoid tumor is:
 a. Esophagus b. Lung (Recent Questions 2013)
 c. Appendix d. Ileum

SMALL INTESTINE TRANSPLANTATION

99. All are true about intestinal transplant except:
 a. Principal barrier to widespread application is vigorous rejection reactions (JIPMER GIS 2011)
 b. Severe form of GVHD occurs when T cells of graft respond to foreign HLA cells

- c. Uniquely dangerous complication is loss of protective mucosal barrier, bacterial translocation and severe sepsis
 d. Majority of intestinal grafts are multi-visceral grafts

MISCELLANEOUS

100. Gangrene of intestine is seen in all the following conditions, except: (All India 2000)
 a. Tricuspid valve endocarditis
 b. Shock
 c. Mesenteric artery thrombosis
 d. Volvulus
101. What is the investigation for small intestine abnormalities except? (PGI Dec 2005)
 a. Enteroclysis b. Radionuclide
 c. CT enteroclysis d. MR enteroclysis
 e. USG enteroclysis
102. Small intestinal biopsy is diagnostic in: (PGI June 2006)
 a. Whipple's disease b. Abetalipoproteinemia
 c. Celiac disease d. Agammaglobulinemia
103. In intestine, lipoma is commonest in: (AIIMS 82, PGI 85)
 a. Rectum b. Sigmoid colon
 c. Caecum d. Ileum
104. Mass in right iliac fossa can be: (Kerala 94)
 a. Ileocecal T.b. b. Ileocecal neoplasm
 c. Ameboma d. All
105. Intestine get strangulated most commonly in which space? (SGPGI 2005)
 a. Omental bursa b. Paraduodenal space
 c. Rectouterine space d. Subphrenic
106. Regarding abdominal cocoon all statements are true except: (PGI Nov 2009)
 a. Common in young girl
 b. Associated with liver fibrosis
 c. Fibrosis of small bowel and stomach
 d. Chronic peritonitis is seen
 e. Seen in tropical and subtropical region
107. Maximum water reabsorption in the gastrointestinal tract occurs in: (All India 2011)
 a. Stomach b. Jejunum
 c. Ileum d. Colon
108. On contrast radiography which among the following is false? (AIIMS May 2011)
 a. Ileum is featureless
 b. Colon has haustrations
 c. Jejunum is feathery
 d. Distal part of duodenum has a cap
109. Pain in hypogastric region may arise from: (PGI May 2010)
 a. Uterus b. Left colon
 c. Urinary bladder d. Gallbladder
110. Vitellointestinal duct closure is usually done at what age? (MHSSMCET 2007)
 a. At birth b. 9 months
 c. 6 weeks d. 12 months
111. Which of the following is most prominent feature of immunoproliferative small intestine disease (IPSID)? (AIIMS May 2012)
 a. Malabsorption b. Obstruction
 c. Bleeding d. Abdominal pain

EXPLANATIONS

MECKEL'S DIVERTICULUM

1. Ans. e. Diarrhea very common (Ref: Sabiston 19/e p1268-1270; Schwartz 10/e p1163-1165, 9/e p1002-1004, 1435; Bailey 26/e p1169-1170, 25/e p1158-1159; Shackelford 7/e p695-698)

Meckel's Diverticulum

- Most commonly encountered congenital anomaly of the small intestine^Q
- Occur 2% of the population^Q.

Rule of two in Meckel's diverticulum

- | | |
|---|--|
| <ul style="list-style-type: none"> • 2% prevalence^Q • 2 inch in length^Q | <ul style="list-style-type: none"> • Half of these who are symptomatic are <2 years^Q of age • 2 feet proximal to ileocecal valve^Q |
|---|--|

- True^Q diverticulum as it has all the 3 layers of the intestine^Q.
- Located on the antimesenteric border of the ileum 45 to 60 cm proximal to the ileocecal valve
- Results from incomplete closure of omphalomesenteric or vitellointestinal duct.
- An equal incidence among men and women^Q.

- MC heterotopic tissue: Gastric mucosa (50%)^Q > Pancreatic mucosa (5%) > colonic mucosa (rarely)

Clinical Features

- Most are entirely benign and incidentally discovered during autopsy, laparotomy, or barium studies

- MC clinical presentation is GI bleeding (25-50%)^Q
- Hemorrhage: MC symptomatic presentation in children ≤2 years^Q

- Hemorrhage is manifested as painless bright red blood from the rectum, with intermittent episodes^Q persisting without treatment.
- Source of the bleeding is a chronic acid-induced ulcer in the ileum adjacent to a Meckel's diverticulum that contains gastric mucosa.
- Intestinal obstruction (31%): Due to volvulus, intussusception, or, rarely, incarceration of the diverticulum in an inguinal hernia (Littre's hernia)^Q.

Complications of Meckel's Diverticulum

- MC complication in children and young adults: Bleeding^Q
- MC complication in adults: Intestinal obstruction^Q

- Diverticulitis (10-20%) is more common in adult patients.
- Progression of the diverticulitis may lead to perforation and peritonitis.

- When the appendix is found to be normal during exploration for suspected appendicitis, the distal ileum should be inspected for the presence of an inflamed Meckel's diverticulum^Q.

Diagnosis

- Most accurate diagnostic test in children: Scintigraphy with sodium 99mTc-pertechnetate^Q.

- The 99mTc-pertechnetate is preferentially taken up by the mucus-secreting cells of gastric mucosa and ectopic gastric tissue in the diverticulum^Q. (Sensitivity-85%, specificity-95% and an accuracy-90% in the pediatric age group)
- Less accurate in adults because of the reduced prevalence of ectopic gastric mucosa^Q
- The sensitivity and specificity can be improved by pentagastrin and glucagon or H2-receptor antagonists (cimetidine)^Q.

- In adults with normal nuclear medicine findings, barium studies should be performed.

Treatment

- Symptomatic Meckel's diverticulum: Diverticulectomy or resection of the segment of ileum^Q bearing the diverticulum.
- Segmental intestinal resection is required for bleeding because the bleeding site usually is in the ileum adjacent to the diverticulum^Q.
- Asymptomatic diverticula found in children during laparotomy should be resected^Q.

- Incidentally found Meckel's diverticulum should be removed at any age up to 80 years as long as no additional conditions (e.g., peritonitis) made removal hazardous^Q.

2. Ans. a. Tc-99 radionuclide scan

3. Ans. d. All incidentally detected Meckel's diverticulum should be resected

4. Ans. a. Scintigraphy

5. Ans. a. Hemorrhage

6. Ans. b. Vitellointestinal duct
 8. Ans. c. Arises at the mesenteric border
 10. Ans. d. Radionuclide scan
 11. Ans. a. Resection of diverticulum (Ref: Sabiston 19/e p1270; Shackelford 7/e p698, 1065)
 7. Ans. b. Meckel's diverticulum
 9. Ans. b. Consists of mucosa without a muscle coat

Incidentally Detected Meckel's Diverticulum (Sabiston 19/e p1270)

- Although the treatment of complicated Meckel's diverticulum is straightforward, controversy still exists regarding the optimal treatment of Meckel's diverticulum noted as an incidental finding.
- It is generally recommended that **asymptomatic diverticula found in children** during laparotomy be **resected**^Q.
- The treatment of Meckel's diverticula encountered in the adult patient, however, remains controversial.
- Recent studies suggest that the issue of prophylactic diverticulectomy in adults should be reevaluated and that, **in selected asymptomatic patients, diverticulectomy may be beneficial and safer than originally reported**^Q.

Incidentally Detected Meckel's Diverticulum (Shackelford 7/e p698)

- Epidemiologic studies suggest that resection of asymptomatic Meckel's diverticulum is indicated in most patients because of **6.4% life time risk of complications** from a Meckel's diverticulum that persist over increasing age groups; a cumulative incidence of early (12%) and late (7%) **post-operative morbidity and mortality** after resection of symptomatic Meckel's diverticula and the 2% life time risk of developing complications after incidental diverticulectomy. Authors concluded that **barring any strong contraindications, incidentally discovered Meckel's diverticula should be removed**.

12. Ans. c. Always gastric epithelium, e. When accidentally seen in laparotomy always resected
 13. Ans. a. Bleeding PR, b. Can be a leading point of intussusception
 14. Ans. d. 2 feet proximal to ileocecal valve on antimesenteric border
 15. Ans. d. All are correct
 16. Ans. a. Bleeding
 17. Ans. c. Meckel's diverticulum
 18. Ans. a. Vitellointestinal duct
 19. Ans. b. 60
 20. Ans. a. Lower GI bleeding
 21. Ans. d. Wide mouth stapling at the base for non bleeding cases (Ref: Bailey 25/e p1159, 24/e p1160)
 Wide mouth stapling at the base for non bleeding ulcer is not done in Meckel's diverticulum.

Meckel's Diverticulectomy

- A Meckel's diverticulum that is broad based should **not be amputated at its base** and invaginated in the same way as a vermiform appendix, because of **risk of stricture**.
- Furthermore, this does not remove heterotopic epithelium where it is present.

22. Ans. a. Lower GI bleeding
 23. Ans. c. Malignancy
 24. Ans. d. Meckel's diverticulum
 25. Ans. d. Metoclopramide
 26. Ans. a. Present in 3% of the population

SMALL INTESTINAL DIVERTICULA

27. Ans. d. Seen on the mesenteric border (Ref: Sabiston 19/e p1264-1268; Schwartz 9/e p1004-1006; Bailey 26/e p1169, 25/e p1158; Shackelford 7/e p691-700)

- MC acquired diverticula of the small bowel: Duodenal diverticula^Q
- MC true congenital diverticulum of the small bowel: Meckel's diverticulum^Q
- Most small intestinal diverticula are false diverticula except Meckel's diverticulum^Q
- Most small intestinal diverticula arises from mesenteric aspect except Meckel's diverticulum^Q

28. Ans. a. Whenever found, should be treated due to increased risk of complications (Ref: Sabiston 19/e p1265-1266; Schwartz 9/e p1004-1006; Bailey 25/e p1158; Shackelford 7/e p691-695)

Duodenal Diverticula

- Relatively common, representing the **second MC site** for diverticulum formation **after the colon**.
- More common in women** (rare in patients <40 years)
- Two thirds to three fourths** are found in the **periampullary region**^Q (within a 2-cm of the ampulla) and project from the medial wall of the duodenum.

Clinical Features

- Mostly asymptomatic, usually noted incidentally by an upper GI studies for an unrelated problem
- Less than 5% of duodenal diverticula will require surgery because of a complication of the diverticulum itself.
- Major complications are obstruction of the biliary or pancreatic ducts that may contribute to cholangitis and pancreatitis, respectively; hemorrhage; perforation; and rarely, blind loop syndrome.

- Only those diverticula associated with the ampulla of Vater are significantly related to complications of cholangitis and pancreatitis^Q.

- In these patients, the ampulla most often enters the duodenum at the superior margin of the diverticulum rather than through the diverticulum itself.

Diagnosis

- Diagnosis by endoscopy or by plain abdominal films showing an atypical gas bubble^Q

Treatment

- Asymptomatic, found incidentally: No treatment
- MC and most effective treatment for symptoms or complications: Diverticulectomy^Q

29. Ans. c. ↓ B12 absorption, e. Steatorrhea (Ref: Sabiston 19/e p1266-1268; Schwartz 9/e p1004-1006; Bailey 26/e p1169, 25/e p1158; Shackelford 7/e p698-700)

Small Intestinal (Jejuno-ileal) Diverticula

- Less common than duodenal diverticula, occur more commonly along the mesentery
- False diverticula, occurring mainly in an older age group (after sixth decade).
- With an increased frequency in the proximal jejunum and distal ileum
- Jejunal diverticula are more common and are larger than those in the ileum.

- Jejunal diverticula are multiple, usually protrudes from the mesenteric border of the bowel and may be overlooked at surgery because they are embedded within the small bowel mesentery^Q

Clinical Features

- Mostly asymptomatic, discovered incidentally
- Vague chronic abdominal pain, malabsorption, functional pseudo-obstruction, and chronic low-grade gastrointestinal hemorrhage.
- Acute complications are diverticulitis, with or without abscess or perforation; gastrointestinal hemorrhage; and intestinal obstruction.
- Stasis of intestinal flow with bacterial overgrowth resulting in steatorrhea and megaloblastic anemia, with or without neuropathy.
- Perforation is the most common complication of jejunoileal diverticular disease and is a sequel of diverticulitis^Q

Treatment

- No treatment for incidentally noted, asymptomatic jejunoileal diverticula^Q
- In case of obstruction, bleeding, and perforation: Intestinal resection and end-to-end anastomosis.
- In malabsorption secondary bacterial overgrowth: Antibiotics^Q

Blind Loop Syndrome

- A rare condition manifested by diarrhea, steatorrhea, megaloblastic anemia, weight loss, abdominal pain^Q.
- Deficiencies of the fat-soluble vitamins (A, D, E, and K) and neurologic disorders^Q.

Etiopathogenesis

- Underlying cause: Bacterial overgrowth in stagnant areas of the small bowel produced by stricture, stenosis, fistulas, or diverticula^Q (e.g., jejunoileal or Meckel's diverticulum).
- Bacterial overgrowth competes for vitamin B₁₂, producing systemic deficiency of vitamin B₁₂ and megaloblastic anemia^Q.

Clinical Features

- Manifested by diarrhea, steatorrhea, megaloblastic anemia, weight loss, abdominal pain
- Deficiencies of the fat-soluble vitamins (A, D, E, and K), as well as neurologic disorders^Q.

Diagnosis

- Diagnosed with cultures obtained through an intestinal tube (gold standard diagnostic test)
- By indirect tests such as the ¹⁴C-xylose or ¹⁴C-cholyglycine breath tests. Excessive bacterial use of ¹⁴C substrate leads to an increase in ¹⁴CO₂.

- In Schilling test, vitamin B₁₂ excretion is not altered by the addition of intrinsic factor, but a course of a broad-spectrum antibiotic (e.g., tetracycline) should return vitamin B₁₂ absorption to normal^Q.

Treatment

- **Parenteral vitamin B₁₂ therapy + Broad-spectrum antibiotic** (tetracycline or amoxicillin-clavulanate)^Q.
- For most patients, a **single course of therapy (7-10 days)** is sufficient, and the patient may remain symptom-free for months.
- **Surgical correction** of the condition producing stagnation and blind loop syndrome **produces a permanent cure** and is indicated in those patients who **require multiple rounds of antibiotics** or are on **continuous therapy**^Q.

GASTROINTESTINAL TUBERCULOSIS

30. **Ans. d.** Conservative management is treatment of choice (Ref: Sabiston 19/e p1254-1255; Schwartz 9/e p1007; Bailey 26/e p1158, 25/e p1174-1175)

Gastrointestinal Tuberculosis

- **Mycobacterium tuberculosis**^Q is responsible for **all the cases** of GI tuberculosis
- *M. bovis* has largely been eliminated by public health measures
- More common in **poor socio-economic status**^Q

Pathogenesis

Primary Intestinal Tuberculosis	Secondary Intestinal tuberculosis
<ul style="list-style-type: none"> • Ingestion of contaminated food^Q may cause primary tuberculosis (this route of infection has decreased in recent years) 	<ul style="list-style-type: none"> • Arises from swallowed sputum^Q containing tuberculous bacilli • Influenced by virulence and quantity of bacilli and host resistance of infection^Q

- When the intestines become infected by **lymphatic spread** from the mesenteric nodes, the **nodal disease** is considered as the **primary site** and intestinal involvement is secondary.
- The **earliest intestinal lesions** are found in **submucosa**^Q, while the overlying mucosa is normal.

Sites of intestinal involvement

- **MC site** is **terminal ileum** and **ileocecal junction**^Q
- Other regions in decreasing frequency are: colon, jejunum, rectum, anal canal, duodenum, stomach and esophagus
- The **site of predilection** is dictated by the factors: abundance of **lymphoid tissue**, rate of **absorption** of intestinal contents, **prolonged stasis** and **digestive activity** of intestinal contents^Q

Pathology**Ulcerative Tuberculosis**

- **Tuberculous intestinal ulcers** are usually **deep** and **transversely placed**^Q in the direction of lymphatics
- **Multiple ulcers** may be seen, most often in **terminal ileum**^Q
- Disease progression is associated with the appearance of **inflammatory mass** around the bowel.
- The **diseased part** of the GIT becomes **thickened** and **serosal surface** is studded with **tubercles**.
- Marked **increase** in **mesenteric fat** with **fat wrapping** around the bowel loops
- **Regional lymph nodes** become **enlarged** and may **caseate**, leading to **mesenteric abscess** formation
- Bowel perforation is **rare** and is usually confined by perilesional inflammatory mass

Hyperplastic Tuberculosis

- A **fibroblastic reaction** occurs in submucosa and subserosa resulting in **marked thickening** of the **bowel wall**^Q
- Involvement of adjacent mesentery, lymph nodes and omentum, results in formation of a mass lesion
- Hyperplastic lesions are due to **reduced bacterial virulence** and **increased host resistance**

Sclerotic or Fibrotic Tuberculosis

- Associated with **strictures** of intestine, typically described as "**napkin-ring strictures**" which may be **single** or **multiple**
- When multiple, strictures may occur in **short segment** of bowel or over the **entire length** of intestine.

Clinical Features

- **Initial symptoms** are vague and **non-specific**^Q
- As the diseases progress, individual may develop **fever** (in **two third**), **night sweats**, malaise, weakness, **anorexia** and **weight loss**^Q.
- **MC symptom** of GI tuberculosis is **abdominal pain**^Q.
- **Diarrhea** is another common symptom.

- Abdominal distention suggests presence of ascites or subacute intestinal obstruction

Primary small bowel disease	Colonic Tuberculosis
Stools are large in amount, foul smelling and resemble those seen in patients with malabsorption ^Q .	Stools may be watery, small in amount and mixed with blood when disease affects predominantly the colon ^Q .

Complications

- Intestinal obstruction and malabsorption are MC complications^Q
- Bowel perforation and GI hemorrhage are less common

Diagnosis:

- Laboratory tests: MC abnormality is raised ESR (90% cases)^Q

Ascitic fluid showing	
<ul style="list-style-type: none"> Lymphocytosis^Q (WBC >500/mm³) High protein^Q content (>2.5 gm/dl) 	<ul style="list-style-type: none"> SAAG <1.1^Q Adenosine deaminase is raised, has sensitivity and specificity of 95%^Q

Radiological Imaging

Ultrasound

- Club-sandwich appearance**^Q (presence of alternating echogenic and echofree layers produce by bowel wall, serosa and the adjacent bowel loops with interloop fluid collection)

CT scan

- High density appearance of ascitic fluid due to **elevated protein content**^Q
- Thickening of bowel wall and ileocecal valve

Barium studies in GI Tuberculosis

- Earliest feature is **spasm and hypermotility** with **edema of valve**^Q
- Thickening of valve lips with **narrowing** of the **terminal ileum** (**Fleishner or umbrella sign**^Q) is characteristic of TB.
- In advance disease, the characteristic deformity includes **symmetric, annular, napkin ring stenosis**^Q and obstruction or shortening and pouch formation.
- The **cecum** become **shrunk** and **retracted** out of the iliac fossa due to contraction of mesocolon (**pulled up cecum**^Q)
- Loss of ileocecal angle with **dilated terminal ileum** imparting **goose neck deformity**^Q
- Narrowing of terminal ileum** due to irritability, along with shortened rigid cecum called as "**Sterlein sign**"^Q
- Persistent narrow stream** of **barium** in the bowel indicates stenosis known as **String sign**^Q

Remember: String sign and Sterlein sign are also seen in Crohn's disease and are not specific for TB^Q.

Treatment

- Treatment of GI tuberculosis is ATT.
- Fever, malaise and weight loss subside in a few weeks^Q.
- Majority of patients (70%) with symptoms of subacute intestinal obstruction and evidence of intestinal strictures show complete resolution of the radiological abnormality^Q

Indications of Surgery in GI Tuberculosis	
<ul style="list-style-type: none"> Intestinal obstruction secondary to stricture (MC)^Q Free perforation^Q 	<ul style="list-style-type: none"> Severe GI hemorrhage^Q Intra-abdominal abscess^Q Internal or external fistula^Q

31. Ans. b. Causes intestinal perforation, c. Commonly associated with pulmonary TB, d. Caused by mycobacterium TB

- MC site of GI tuberculosis: Ileocecal region^Q
- MC type of Abdominal tuberculosis: Peritoneal tuberculosis^Q

32. Ans. a. Diarrhea, c. Stricture, d. Malabsorption

34. Ans. c. Surgery is the treatment of choice

36. Ans. b. Ileum

38. Ans. a. String sign, b. Goose neck sign, c. Right sided obstruction, d. Pulled up cecum, e. Sterlein sign

39. Ans. b. Typhoid (Ref: J Indian Med Assoc 199; 89:255-6)

33. Ans. b. Intestine obstruction

35. Ans. a. Obstruction

37. Ans. d. Intestinal mucosa

- Ileal perforation is a common problem seen in tropical countries. The commonest cause being typhoid fever^Q.
- In western countries the causes are malignancy, trauma and mechanical etiology, in the order of frequency^Q.

40. Ans. c. Ileocecal tuberculosis

41. Ans. a. Ileocecal TB

SUPERIOR MESENTERIC ARTERY SYNDROME

42. Ans. d. Most common in 6th-7th decade (Ref: Sabiston 19/e p1276; Shackelford 7/e p866)

Superior Mesenteric Artery Syndrome

- Vascular compression of **third portion^Q** of the **duodenum** by the **superior mesenteric artery** as it passes over this portion of the duodenum.
- Also known as **Wilkie's syndrome**, **cast syndrome**, and **arteriomesenteric duodenal ileus or compression^Q**

Three Mechanical Factors Must be Present

- An abnormally **narrow, aortomesenteric angle^Q**
- An abnormally **highly fixed transverse duodenum^Q**
- An **abnormal course** of the **mesenteric artery^Q** continuing inferiorly, anterior to the unyielding vertebral column
- **Most commonly** seen in **young asthenic individuals**, with **women** being more commonly affected than men^Q.
- **SMA** normally leaves **aorta** at an **acute angle (50-60°)**
- Normally a **mass of fat and lymphatics** near **origin of SMA** is believed to **protect duodenum from compression**.

Predisposing Factors

- | | |
|--|---|
| <ul style="list-style-type: none"> • Rapid weight loss^Q • Supine immobilization^Q • Rapid growth of height^Q | <ul style="list-style-type: none"> • Scoliosis^Q • Placement of a body cast^Q |
|--|---|

Clinical Features

- Symptoms include profound nausea and vomiting, **abdominal distention**, **weight loss**, and **postprandial epigastric pain^Q**, which varies from intermittent to constant depending on the severity of the duodenal obstruction.
- **Weight loss** usually occurs **before** the **onset of symptoms** and contributes to the syndrome.

Diagnosis

- **Barium** upper gastrointestinal series or **hypotonic duodenography^Q**, which demonstrates abrupt or near-total cessation of flow of barium from the duodenum to the jejunum.
- CT has been useful in certain instances.

Treatment

- **Conservative measures** are tried initially and have been **increasingly successful** as **definitive treatment**.
- The **operative treatment of choice** is **duodenojejunostomy^Q**.

43. Ans. b. Duodenal obstruction

44. Ans. d. Gastrojejunostomy is treatment of choice in chronic cases

- TOC in **annular pancreas**: **Duodenoduodenostomy^Q**
- TOC in **duodenal atresia**: **Diamond shaped Duodenoduodenostomy^Q**
- TOC in **SMA syndrome**: **Duodenojejunostomy^Q**

PNEUMATOSIS INTESTINALIS

45. Ans. a. Pneumatosis cystoides intestinalis (Ref: Sabiston 19/e p1272-1273; Schwartz 10/e p1170-1171, 9/e p1009; Shackelford 7/e p1057-1058)

Pneumatosis Intestinalis

- An uncommon condition presenting as **multiple gas-filled cysts** of the gastrointestinal tract.
- Located in the **subserosa**, **submucosa**, and, rarely, **muscularis layer**

- **MC site: Jejunum^Q** > ileocecal region > colon (Can occur anywhere)

- **Equal incidence** among **males** and **females^Q**
- Most commonly occurs in the **4th-7th decades^Q** of life.
- Pneumatosis in **neonates** is usually associated with **necrotizing enterocolitis^Q**.

Pathology

- On histologic section, **honeycomb appearance^Q**.
- The cysts are **thin walled** and break easily.
- **Spontaneous rupture** gives rise to **pneumoperitoneum**.

Predisposing Factors

- COPD^Q
- **Immunocompromised state**^Q (AIDS; transplantation; leukemia, lymphoma, vasculitis, or collagen vascular disease; patients taking chemotherapy or corticosteroids).
- **Inflammatory, obstructive, or infectious conditions** of the intestine^Q
- Endoscopy and jejunostomy placement; **ischemia**^Q
- Diabetes^Q

Clinical Features

- Symptoms are **nonspecific**, most commonly **diarrhea, abdominal pain, abdominal distention**, nausea, vomiting, weight loss, and **mucus in stools**^Q.
- **Pneumoperitoneum** occurs usually in association with **small bowel** rather than large bowel **pneumatosis**^Q.

- **Pneumatosis intestinalis** represents one of the few cases of **sterile pneumoperitoneum** and should be considered in the patient with **free abdominal air** but **no evidence of peritonitis**^Q.

Diagnosis

- On **plain films**, **radiolucent areas** within the **bowel wall** (appear as **grapelike clusters** or **tiny bubbles**)^Q
- Alternatively, **barium contrast** or **CT studies** can be used to **confirm the diagnosis**^Q.

Treatment

- Management of the **uncomplicated primary disease** is **conservative**.

- When **symptoms demand treatment**, the **first line** is **intermittent high flow oxygen therapy**^Q, providing a concentration of 70% continuously for 5 days by nasal specula.
- The cysts may also resolve with antibiotics, particularly **metronidazole**^Q.
- In **resistant cases**, maintenance treatment with **sulfasalazine**^Q may be helpful.

- **Prognosis** in most patients is that of the **underlying disease**^Q.

46. Ans. a. High flow oxygen therapy

47. Ans. b. Neonatal necrotizing enterocolitis

48. Ans. b. Surgical resection indicated

49. Ans. a. Pneumatosis cystoides intestinalis

50. Ans. b. Necrotizing enterocolitis

SHORT BOWEL SYNDROME

51. Ans. b. Short bowel syndrome (Ref: Sabiston 19/e p1274-1276; Schwartz 10/e p1171-1173, 9/e p1009-1010; Bailey 26/e p266, 25/e p228-229; Shackelford 7/e p998-1014)

Short bowel syndrome

- **Malabsorptive condition** that arises secondary to **removal of significant segments of the small intestine**^Q.
- Most common causes are **Mesenteric infarction**^Q, **Crohn's disease**^Q, **Trauma**^Q, **Volvulus**^Q.

Changes seen in Terminal Ileal Resection

- | | |
|---|---|
| <ul style="list-style-type: none"> • Malabsorption of bile salts and vitamin B₁₂ (which are normally absorbed in this region) • Vitamin B₁₂ Malabsorption → Megaloblastic anemia^Q • Bile salts Malabsorption → Unabsorbed bile salts escape into colon and stimulate fluid secretion from the colon → watery diarrhea^Q. • Decreased bile salts in the bile → Cholesterol gall stones^Q | <ul style="list-style-type: none"> • Reduction in bile salt pool → steatorrhea^Q and Malabsorption of fat soluble vitamins (due to fat malabsorption) • Unabsorbed fatty acids bind with calcium → Increased concentration of free oxalates (oxalates bind with calcium normally and therefore escape without intestinal absorption) → Free oxalates are absorbed → Oxalate kidney stones^Q. |
|---|---|

Removal of ileocecal valve

- **Bacterial overgrowth**^Q from the **colon** → **diarrhea** and **malabsorption**^Q
- Decrease in **intestinal transit time**^Q

Adaptive Response

- **Resection of up to 70%** of the **small bowel** usually can be **tolerated** if the terminal ileum and ileocecal valve are preserved.
- **Length alone**, however, is **not the only determining factor** of complications related to small bowel resection.

- **Proximal bowel resection** is **tolerated much better** than **distal resection**^Q
- Because the **ileum can adapt** and **increase its absorptive capacity** more efficiently than the **jejunum**^Q.

Treatment

- Early phase: Control diarrhea, replacement of fluid and electrolytes, and TPN^Q
- H₂-receptor antagonists or PPI for acid hypersecretion^Q
- Cholestyramine^Q for cathartic effects of unabsorbed bile salts in the colon.

- Hypergastrinemia and gastric hypersecretion occur after massive small bowel resection and greatly contribute to diarrhea after a massive small bowel resection^Q.

Intestinal lengthening operation

- Bianchi Procedure^Q: Longitudinal intestinal lengthening and tailoring
- STEP: Serial transverse enteroplasty procedure^Q

52. Ans. a. Hypogastrinemia

53. Ans. d. All of the above

54. Ans. a. Vitamin B12

55. Ans. c. More oxalate absorption in gut

56. Ans. a. Hypogastrinemia (Ref: Harrison 18/e p2472)

- Harrison says "Gastric hypersecretion of acid occurs in many patients following large resection of the small intestine. The etiology is unclear but may be related to reduced hormonal inhibition of acid secretion or increased gastrin levels due to reduced small intestinal catabolism of circulating gastrin."

RADIATION ENTERITIS

57. Ans. a. Radiation enteritis (Ref: Sabiston 19/e p1273-1274; Schwartz 10/e p1162-1163, 9/e p1001-1002; Shackelford 7/e p986-997)

Radiation Enteritis

- Radiation therapy affect rapidly dividing cells in small intestine
- Rapidly dividing cells in small intestinal epithelium may sustain severe, acute, and chronic deleterious effects.

- Serious late complications are unusual if the total radiation dosage is <4000 cGy^Q
- Morbidity risk increases with dosages >5000 cGy^Q.

Pathology

- Radiation damage tends to be acute and self-limiting^Q
- Late effects of radiation injury:
 - Damage to the small submucosal blood vessels^Q
 - Progressive obliterative arteritis and submucosal fibrosis^Q
 - Thrombosis and vascular insufficiency^Q

Predisposing Factors

- Previous abdominal operations^Q
- Preexisting vascular disease, hypertension, diabetes^Q
- Adjuvant treatment: 5-FU, doxorubicin, dactinomycin and methotrexate^Q

Clinical Features

- Radiation damage tends to be acute and self-limiting, with symptoms consisting mainly of diarrhea, abdominal pain, and malabsorption^Q.

- Late effects of radiation injury resulting eventually in thrombosis and vascular insufficiency leading to necrosis and perforation of the involved intestine, but more commonly stricture formation with symptoms of obstruction or small bowel fistulas^Q.

Prevention

- By adjusting ports and dosages of radiation to deliver optimal treatment specifically to the tumor and not to surrounding tissues.
- Exclude the small bowel from the irradiated field by reperitonealization, omental transposition, and placement of absorbable mesh slings.
- Sucralfate is used to prevent diarrhea associated with abdominal radiation.
- Superoxide dismutase reduces complications.

- Most effective radioprotectant: Amifostine^Q (WR-2721)

Treatment

- Acute radiation enteritis: Control symptoms with antispasmodics, analgesics antidiarrheal agents^Q.

- Operative intervention: Obstruction (MC), fistula formation, perforation and bleeding^Q
- Operative procedures: Bypass or resection with reanastomosis.

58. Ans. b. 5000 rad

59. Ans. b. 4000 rad

ENTERIC FEVER

60. Ans. c. 3rd week (Ref: Sabiston 19/e p1254; Schwartz 9/e p1007; Bailey 26/e p91-92, 25/e p1174; Harrison 18/e p1276)

Enteric Fever or Typhoid

- Enteric fever is a potentially life-threatening systemic disease characterized by **fever** and **abdominal pain**^Q
 - It is caused by **Salmonella typhi** or **paratyphi**^Q
 - Typhoid is the MC cause of ileal perforation in tropical countries (India)^Q.
- Pathology**
- Ulceration and necrosis of ileocecal Peyer's patches^Q
 - The ulcer is **parallel to the long axis** of the gut and is usually situated in the **lower ileum (longitudinal ulcers)**^Q
 - Perforation of a **typhoid ulcer** usually occurs during the **third week**^Q and is occasionally the first sign of the disease.

Clinical Features

- Fever and abdominal pain are **hallmark symptoms**^Q
- Non-specific symptoms: Headache, cough, sweating, myalgia, arthralgia, fatigue
- **Paralytic ileus** is the MC **complication**^Q of typhoid.
- **Intestinal hemorrhage (2nd MC)**^Q may be the leading symptom.

Complications of Enteric Fever

<ul style="list-style-type: none"> • Paralytic ileus (MC)^Q • Intestinal hemorrhage (2nd MC)^Q • Perforation^Q • Cholecystitis^Q 	<ul style="list-style-type: none"> • Phlebitis • Genitourinary inflammation • Arthritis • Osteomyelitis
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Characteristic signs

- Rose spots, splenomegaly, leucopenia with shift to left^Q
- Lipopolysaccharide endotoxin is responsible for leucopenia and splenomegaly^Q
- Relative bradycardia despite of high fever^Q

61. Ans. b. Longitudinal ulcers

62. Ans. a. Plain X-ray of abdomen in erect posture

63. Ans. c. Enteric perforation

SMALL BOWEL RESECTION AND ANASTOMOSIS

64. Ans. a. Suture in 1 layer by non-absorbable suture (Ref: Shackelford 7/e p920-928)

Bowel Anastomosis

- Good surgical technique is **more important** than the choice of suture material:
 - Gentle handling^Q of the bowel
 - Adequate hemostasis^Q
 - Meticulous approximation^Q of well-vascularized bowel
 - Tension-free anastomosis^Q

Two-layer Anastomoses	One-layer Anastomoses
<ul style="list-style-type: none"> • Inner layer is an absorbable 3-0 or 4-0 running full-thickness stitch^Q • Outer layer is an inverting, usually 3-0, seromuscular stitch, which may be running or interrupted nonabsorbable^Q. 	<ul style="list-style-type: none"> • A full-thickness technique, interrupted or running with nonabsorbable suture^Q

65. Ans. c. Strictureplasty

- For **multiple strictures** involving **long segment** of small intestine, **strictureplasty** is preferred to **prevent short bowel syndrome**^Q.

ENTERIC FISTULA

66. Ans. c. Non-epithelialization (Ref: Sabiston 19/e p1270-1272; Schwartz 9/e p997-998; Bailey 26/e p1179-1180, 25/e p1184-1185; Shackelford 7/e p944-946)

Factors Preventing Spontaneous Fistula Closure	
<ul style="list-style-type: none"> • High output (>500 mL/day)^Q • Severe disruption of intestinal continuity^Q (>50% of bowel circumference) • Active inflammatory bowel disease^Q of bowel segment • Cancer^Q 	<ul style="list-style-type: none"> • Radiation enteritis^Q • Distal obstruction^Q • Undrained abscess cavity^Q • Foreign body^Q in the fistula tract • Fistula tract <2.5 cm long^Q • Epithelialization of fistula tract^Q

67. Ans. d. Track length >3 cm

68. Ans. a. Tract <1 cm

69. Ans. c. >2 cm fistulous tract

Enterocutaneous fistula

- Enterocutaneous fistulas are **most commonly iatrogenic**, usually the result of a **surgical misadventure**^Q

Surgical misadventure leading to Enterocutaneous fistula

- **Anastomotic leakage**^Q
- **Injury of the bowel or blood supply**^Q
- **Laceration of the bowel by wire mesh or retention suture**^Q

Etiology of Enterocutaneous fistula	
<ul style="list-style-type: none"> • iatrogenic (MC)^Q • Erosion by suction catheters adjacent abscesses, or trauma^Q • Previous radiation therapy^Q • Intestinal obstruction^Q 	<ul style="list-style-type: none"> • Inflammatory bowel disease • Mesenteric vascular disease • Intra-abdominal sepsis • Crohn's disease^Q leading to spontaneous fistula in 2% cases

Clinical Features

Typical clinical presentation
<ul style="list-style-type: none"> • Typical clinical presentation is that of a febrile, postoperative patient with an erythematous wound^Q. • When a few skin sutures are removed, a purulent or bloody discharge is noted; leakage of enteric contents then occurs, sometimes immediately, but often within 1 or 2 days^Q.

- If the **diagnosis is in doubt**, **confirmation** can be obtained by **oral administration** of a **nonabsorbable marker**, such as **charcoal** or **Congo red**, or by **injection of water-soluble contrast medium** into the fistula^Q.

- In general, the **more proximal the fistula** in the intestine, the **more serious the problem**, with **greater fluid and electrolyte loss**^Q.
- The **drainage** has a **greater digestive capacity**, and the **distal segment is not available for absorption of nutrients**^Q.

Diagnosis

- **Fistulogram**^Q to determine:
 - **Presence and extent** of any **abscess cavities**
 - **Length of the tract**
 - **Extent of bowel wall disruption**
 - **Location** of the fistula
 - Whether a **distal obstruction** is present
- CT is helpful in determining whether **underlying collections of fluid or pus** are present.

Treatment

- Successful management requires establishment of **controlled drainage**, usually using a **sump suction apparatus**; **management of sepsis**; **prevention of fluid and electrolyte depletion**; **protection of the skin**; and **provision of adequate nutrition**^Q.
- When **sepsis** has been **controlled** and **nutritional therapy** has been instituted, a course of **conservative management**^Q should be followed.

- **Most of these fistulas heal spontaneously** within **4-6 weeks** of **conservative management**^Q. If closure is not accomplished after this time, surgery is indicated.

- This **period of conservative management** not only allows those **fistulas to heal spontaneously** but also allows for **optimization of nutritional status** and **control of the wound and fistula sites**^Q.
- Also, a **reasonable delay** permits the **peritoneal reaction** and **inflammation** to **subside**, thus **making a second operation easier and safer**^Q.

- **Preferred operation**: **Fistula tract excision** and **segmental resection** of the **involved segment of intestine** and **reanastomosis**^Q.

- **Simple closure** of the fistula after removing the fistula tract **almost always results in a recurrence** of the fistula.
- If an **unexpected abscess** is encountered or if the **bowel wall is rigid and distended** over a **long distance**, thus making primary anastomosis unsafe, **exteriorization of both ends** of the **intestine** should be accomplished.

Complications

- **Sepsis**, **fluid and electrolyte depletion**, **necrosis of the skin** at the site of external drainage, and **malnutrition**^Q.
- **Mortality rates** for patients with enterocutaneous fistulas remain high (15-20%)

70. Ans. b. Duodenal

- In general, the **more proximal the fistula** in the intestine, the **more serious the problem**, with **greater fluid and electrolyte loss**^Q.
- The **drainage** has a **greater digestive capacity**, and the **distal segment** is **not available for absorption of nutrients**^Q.

INTESTINAL ATRESIA AND DUPLICATION

71. Ans. a. Intestinal atresia (Ref: Sabiston 19/e p1841-1843; Schwartz 10/e p1615-1616, 9/e p1427; Bailey 25/e p84-85; Shackelford 7/e p1049-1051)

Intestinal Atresia

- MC site of intestinal atresia: **Duodenum**^Q
- MC cause of neonatal intestinal obstruction: **Duodenal atresia**^Q

Jejunioileal Atresia

- Atresia and stenosis are among the **MC causes** of **neonatal intestinal obstruction**^Q.
- Incidence of jejunioileal atresia is **1 in 300 to 1500**^Q live births.
- **Gender ratio** is **equal**.
- **Jejunal atresia** is slightly **more common** than ileal atresia.
- In **80-90%** of cases the atresia is **isolated**. However, in up to **20%** of cases **atresias are multiple**.

- **Cystic fibrosis** is an important comorbid condition with **reported incidence** is **10-20%**. **White infants** with **jejunoileal atresia** have **more than 210 times** the **risk for cystic fibrosis**^Q.

Clinical Features

- Infants with atresia or stenosis usually have **bilious vomiting** on the **first day of life**.
- The **higher the obstruction**, the **earlier the vomiting**.
- **Abdominal distention** is more pronounced with **distal obstruction**.
- More than **60%** of these **infants fail to pass meconium** in the **first day of life**, may have **grayish mucoid contents** in the rectal vault^Q.

Diagnosis

- Can be diagnosed by **prenatal ultrasonography**^Q.
- Associated with **maternal polyhydramnios**^Q
- **Abdominal radiographs** show **gas- and fluid-filled bowel loops** with **absence of gas distally**^Q.

Treatment

- Management includes **intravenous fluid**, **decompression** of the stomach, withholding of enteral feeding, and **antibiotics**.
- **After resuscitation** the infant is taken to the operating room for **exploratory laparotomy**.
- The goals of the operation are to **restore intestinal continuity after resection** of the **atretic segment** while preserving intestinal length.

Prognosis

- The prognosis in these patients is **excellent**, with **survival rates of 90%**^Q.
- Risk of **adhesive bowel obstruction** and **necrotizing enterocolitis (NEC)**^Q
- Extensive resection of the bowel can lead to **short-bowel syndrome**.

72. Ans. c. Ileum (Ref: Shackelford 7/e p1051-1053)

Small Intestinal Duplication

- Intestinal duplications are **mucosa-lined structures** that are **in continuity** with the GI tract.
- MC site of duplication: **Ileum** (within the leaves of the mesentery)^Q
- Located **along mesenteric border**, contain **all the three layers of bowel**^Q
- Share a **common wall** and **blood supply** with adjacent bowel^Q

Types of Small Intestinal Duplication	
Cystic	Tubular
<ul style="list-style-type: none"> • More common (75%)^Q • Do not have communication with the lumen^Q of the normal small intestine • Manifested as partial small bowel obstruction^Q 	<ul style="list-style-type: none"> • Less common (25%) • Parallel to the normal bowel lumen^Q • Higher incidence of communication^Q with the existing lumen of the small intestine • Significant incidence of ectopic gastric mucosa^Q. • Bleeding^Q is a common manifestation

Clinical Features

- Recurrent abdominal pain, emesis from intestinal obstruction, and hematochezia^Q.
- Bleeding from ulceration in the duplication or in the adjacent intestine if the duplication contains ectopic gastric mucosa^Q.

Diagnosis

- CT, ultrasonography, and technetium pertechnetate scanning can be very helpful.
- USG: Classical triple layer effect^Q

Treatment

- **Short duplications:** Resection of the cyst and adjacent intestine with end-to-end anastomosis^Q
- **Long duplications:**
 - Multiple enterotomies and mucosal stripping^Q in the duplicated segment, which will allow the walls to collapse and become adherent.
 - Divide the common wall using a linear cutting stapler^Q to form a common lumen.
- Excellent prognosis in duplications who undergo complete excision^Q without compromise of the length of remaining intestine

73. Ans. b. Intestinal atresia

74. Ans. a. Spherical type is MC, b. Tubular type is attached longitudinally with bowel

75. Ans. a. Duodenum

76. Ans. d. Duodenoduodenostomy

77. Ans. c. Type 3 (Ref: Sabiston 19/e p1842; Shackelford 7/e p1050)

Classification of Intestinal Atresia	
Type I	Membranous atresia with intact bowel and mesentery
Type II	Blind ends separated by a fibrous cord
Type IIIa	Blind ends separated by a V-shaped mesenteric defect
Type IIIb	Apple peel atresia ^Q or Christmas tree ^Q atresia
Type IV	Multiple atresias (string of sausages) ^Q

NEOPLASMS OF SMALL INTESTINE

78. Ans. a. Lymphoma (Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Bailey 26/e p1159-1160, 25/e p1175-1177; Shackelford 7/e p771)

Small-Bowel Neoplasm

- MC tumor of small bowel: Leiomyoma^Q > Adenoma^Q
- MC tumor of small bowel in children: Lymphoma^Q
- MC malignant tumor of small bowel: Carcinoid > Adenocarcinoma^Q
- MC site of small bowel malignancy, carcinoids, lymphoma: Ileum^Q

79. Ans. b. Most common site is ileum (Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Shackelford 7/e p771)

- Duodenum is MC site of Atresia and Adenocarcinoma^Q.
- Jejunum is MC site of (PIA): Pneumatosis Intestinalis, Angiodysplasia^Q
- Ileum is MC site of (DAL-3): Duplication, Adenoma (tubular), Lipoma, Lymphoma, Leiomyoma^Q.

80. Ans. b. Carcinoid tumors

81. Ans. a. Leiomyoma (Ref: Shackelford 7/e p771)

Benign Tumors of the Small Intestine	
Type of Lesion	%
Leiomyomas ^Q	25–50
Adenomas ^Q	11–35
Lipomas	15–25
Hemangiomas	7–10
Neurogenic tumors (GIST)	<5–10

82. Ans. d. Palliative surgeries are done even in presence of metastasis (Ref: Sabiston 19/e p1258-1264; Schwartz 9/e p999-1001; Bailey 26/e

p1159-1160, 25/e p1175-1177; Shackelford 7/e p778-780)

Small Bowel Malignancies

- **MC malignant neoplasms of the small bowel:** Carcinoid tumors^Q > adenocarcinomas > malignant GISTs > lymphomas.
- Adenocarcinomas are more numerous in the proximal small bowel, whereas the other malignant lesions are more common in the distal intestine (ileum)^Q.

Clinical Features

- In contrast to benign lesions, malignant neoplasms almost always produce symptoms^Q

- **MC symptom:** Abdominal pain > weight loss^Q

- Obstruction develops in 15-35% of patients and, in contrast to the intussusception produced by benign lesions, is usually the result of tumor infiltration and adhesions.
- Diarrhea with tenesmus and passage of large amounts of mucus may occur.
- Adenocarcinomas may produce the typical constricting apple-core lesions similar to those observed in the colon.

- Gastrointestinal bleeding is more common with leiomyosarcomas^Q.

- A palpable mass may be felt in 10-20% of patients, and perforations develop in about 10%, usually secondary to lymphomas and sarcomas.

Diagnosis

- Barium meal follow through (BMFT): Accurate diagnosis in 50-70% of patients with malignant neoplasms of the small intestine
- Enteroclysis (small bowel enema): Diagnostic accuracy of about 90%^Q

Treatment

- Wide resection including regional lymph nodes^Q.

- Often, surgical resection for cure is not possible. Therefore, palliative resection should be performed to prevent further complications of bleeding, obstruction, and perforation^Q.

- Adjuvant radiation and chemotherapy have little role in the treatment of patients with adenocarcinomas of the small bowel.

Prognosis

- Only half of the patients operated on for malignant tumors of the small intestine have lesions amenable to curative resection.
- One third have a distant metastasis at the time of initial surgery
- Overall 5-year survival rate after surgical treatment of malignant tumors is only 25%
- Adenocarcinoma has the poorest prognosis, with an overall survival rate of 15-20%.

- Obstruction in CA small bowel develops in 15-35% of patients, due to tumor infiltration and adhesions^Q.
- Obstruction in benign lesions is due to intussusceptions^Q.

83. Ans. a. Ba meal follow through, d. CT scan with contrast

84. Ans. b. Arises from periampullary region, c. Jaundice and anemia found, e. Surgery is only curative

85. Ans. b. Primary small-intestinal lymphomas are most commonly located in the ileum, c. Lymphoma is most common primary malignant neoplasm of Spleen, d. Stomach is most common site for extranodal lymphoma and e. MALT lymphoma is associated with H. pylori infection (Ref: Robbins 7/e p868-869, 826; Harrison 17/e p767, 775; Sabiston 19/e p1263-1264, 18/e p1507)

Gastrointestinal Lymphoma

- Any segment of the gastrointestinal tract may be secondarily involved by systemic dissemination of non-Hodgkin lymphomas.
- However, up to 40% of lymphomas arise in sites other than lymph nodes, and the gut is the most common location^Q.

- Intestinal lymphoma involves the ileum (MC)^Q, jejunum, and duodenum, in decreasing frequency, a pattern that mirrors the relative amount of normal lymphoid cells in these anatomic areas.

- Primary GI lymphomas usually arise as sporadic neoplasms^Q
- Intestinal tract lymphomas can be classified into B-Cell and T-Cell lymphomas^Q.
- Intestinal T-cell lymphoma is usually associated with a long-standing malabsorption syndrome (such as celiac disease)^Q.
- MC splenic neoplasm is NHL^Q.
- Stomach is the MC site for extranodal lymphoma^Q.

Primary GI lymphomas occur more frequently in

- | | |
|--|---|
| <ul style="list-style-type: none"> • Chronic gastritis caused by H. pylori^Q • Chronic sprue^Q like syndromes • Natives of the Mediterranean region^Q | <ul style="list-style-type: none"> • Congenital immunodeficiency states^Q • HIV infection^Q • Following organ transplantation with immunosuppression^Q |
|--|---|

Pathology

- All the gut lymphoid tissue is mucosal and submucosal, early lesions appear as **plaque-like expansions** of the mucosa and submucosa.
- **Diffusely infiltrating lesions** may produce **full-thickness mural thickening**, with effacement of the overlying mucosal folds and focal ulceration.
- Diffuse infiltrating type is **more common than polypoidal**.

86. Ans. b. Melanoma (Ref: Sabiston 19/e p1264)

- **Cutaneous melanoma** is the MC extra-abdominal source to involve the small intestine; others include adenocarcinoma of the breast and carcinoma of the lung.

87. Ans. d. Causes malabsorption

CARCINOID TUMORS

88. Ans. a. Small bowel is the least common site (Ref: Sabiston 19/e p1258-1262; Schwartz 9/e p999-1001; Bailey 26/e p1160, 25/e p1176-1177; Shackelford 7/e p1021-1023; Harrison 18/e p3060-3064)

Carcinoid Tumors

- **Distribution (BIRACS)**: Bronchus > Ileum > Rectum > Appendix > Colon > Stomach
- Arise from **enterochromaffin cells** at the **base of the crypts of Lieberkuhn** in the GI tract.

Foregut carcinoids	Mostly argyrophilic (silver staining only with the addition of a reducing agent)
Midgut carcinoids	Argentaffinic (silver staining)
Hindgut carcinoids	Mixed (60-70% argyrophilic and 8-16% argentaffinic)

- MC foregut location for carcinoid tumors: **Stomach**
- **Colonic carcinoids** occur more commonly on the **right side**, in the ascending or proximal transverse colon.
- **Small bowel carcinoids** are **multiple** in 25% of cases.
- **Appendiceal carcinoids** are typically **solitary lesion**.

- **Highest percentage of non-localized disease (PCS):** Pancreatic (91%) > colonic (77%) > small intestinal carcinoid tumors (75%)
- **Highest percentage localized disease (LOAR):** Laryngeal carcinoid tumors (100%) > Ovary, appendix > rectum

Pathology

- GIT carcinoids produce a variety of peptide hormones, the **most common is serotonin**.
- **Foregut carcinoids** produce **low levels of serotonin** (5-hydroxytryptamine) but may secrete 5-hydroxytryptophan or adrenocorticotrophic hormone.
- **Hindgut carcinoids rarely produce serotonin** but may produce other hormones such as somatostatin and peptide YY.
- **Gastric carcinoid patients** are **deficient in the enzyme dopa-decarboxylase**, the enzyme responsible for **conversion of 5-hydroxytryptophan to serotonin** (5-hydroxy tryptamine).

Malignant potential in Carcinoids depends on	
• Location	• Depth of invasion
• Size	• Growth pattern

- In small bowel carcinoid (SBC), frequent **coexistence** of a **second primary malignant neoplasm** of a **different histological type**, this usually is a **synchronous adenocarcinoma**, most commonly in the **colon** and **breast**.
- Associated with MEN-I in 10% of cases.

Clinical Features

- MC symptom of SBC: **Intermittent intestinal obstruction**

Malignant Carcinoid Syndrome

- Occur in fewer than **10%** of patients with carcinoid tumors.
- **Midgut carcinoids** are the **MC source** of carcinoid syndrome.
- Attacks may be spontaneous or precipitated by **stress, alcohol, a large meal or sexual intercourse**.
- Common symptoms and signs include **cutaneous flush (80%)**; **diarrhea (76%)**; **hepatomegaly (71%)**; **cardiac lesions (70%)**; **asthma (25%)**.
- **Bright-red patchy flushing** which is typically seen with gastric carcinoids

- The **diarrhea** is directly **related to serum serotonin level** (serotonin stimulates secretin release), **episodic** usually occurring **after meals, watery** and often **explosive**; and serotonin antagonist **methylsergide** effectively **controls** the symptoms (**Ondansetron** is particularly **effective** in treating **diarrhea** apparently through the **restoration of normal colonic motility**)^Q.
- MC cardiac lesions: **Tricuspid insufficiency (TR), pulmonary stenosis (PS), tricuspid stenosis. (TR>PS>PR>TS)**^Q

Atypical or Variant Carcinoid Syndrome

- Occur in patients with **gastric carcinoid tumors**^Q.
- These patients experience **cutaneous flushes** that are **patchy and highly pruritic**.
- Diarrhea, bronchospasm, and cardiac lesions** are **rare**.
- The syndrome is due to large release of **histamine** from the tumor rather than serotonin.

Diagnosis

- Elevated urinary levels of **5-HIAA**^Q (5-hydroxyindoleacetic acid) measured **over 24 hours** with high-performance liquid chromatography are **highly specific**^Q.

- Plasma concentration of **chromogranin A** is **100% specific**^Q

- Provocative tests using **pentagastrin, calcium, or epinephrine** are used to reproduce the symptoms of carcinoid tumors. The administration of **pentagastrin** is the **safest and most reliable** and the **most frequently used**^Q.
- Radiographic imaging is difficult because of the **small size of most tumors** and their common **submucosal location**^Q.
- The submucosal location lends to **more accurate localization with contrast studies** especially **enteroclysis**^Q, than with conventional sectional imaging such as CT scan.

- Initial imaging procedure** to **localize and stage** the carcinoid tumors: **SRS**^Q

Treatment

Surgery

- Carcinoid tumors of the **jejunum and ileum: segmental resection and en-bloc lymphadenectomy**^Q.
- Resection** of the primary tumor **regardless of metastasis**, to avoid complications from growth of the primary tumor in terms of **bleeding, obstruction and abdominal pain** especially with **midgut carcinoids** because of their propensity to cause **intense fibrosing reaction**^Q.

Medical therapy

- It includes chemotherapy and biological agents such as **somatostatin analogs** and **interferon alpha**^Q.
- Chemotherapy: Dacarbazine, epirubicin and 5-FU (DEF)**^Q.
- Carcinoid tumors express **all five subtypes** of somatostatin receptors with **predominance** of receptor subtypes **2 and 5**; receptor subtypes **1 and 3** mediate **anti-tumor effect**^Q.
- Octreotide** administration leads to reduction of symptoms, including flushing and diarrhea.
- Newer treatment includes **In111-Octreotide** and **I124-labeled MIBG (metaiodobenzylguanide)**^Q.

Targeted Radiotherapy

- Smart bombs**^Q: **Radiolabeled somatostatin analogues** that deliver radiation specifically to carcinoids cells. **Indium-111-labeled pentetreotide** demonstrate an enhanced tumor regression response.

Prognosis

- Carcinoid tumors have the **best prognosis** of all **small bowel tumors**, whether the disease is **localized or metastatic**^Q.

- Most useful prognostic marker** is an elevated level of **chromogranin A**^Q.
- Midgut carcinoid** has the **best prognosis**^Q.

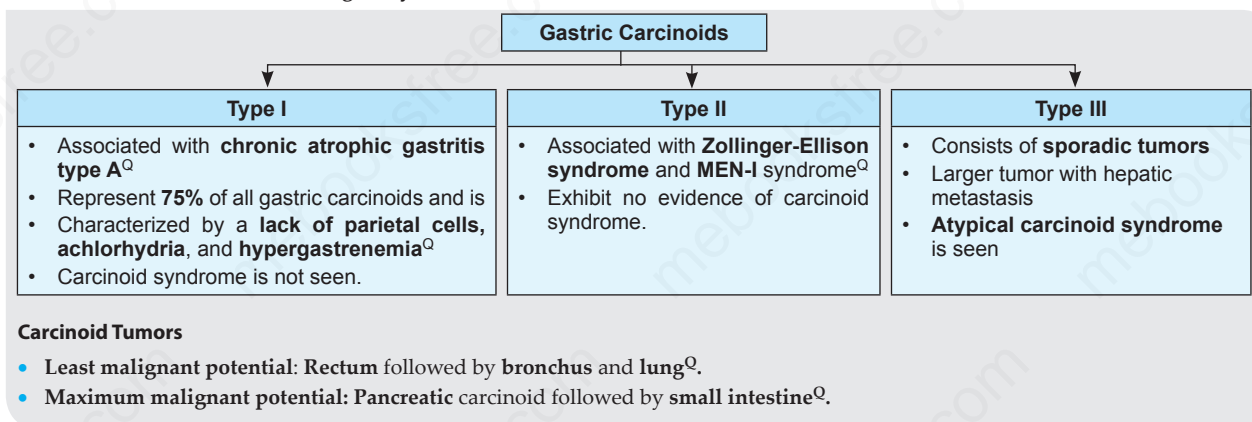
- Female gender and younger age**^Q is associated with **better prognosis**
- One of the main determinants of survival is the **presence of liver metastases**^Q.

89. Ans. b. Extensive involvement of small intestine is associated with higher probability of lung metastasis (Ref: Sabiston 19/e p1258-1262; Schwartz 9/e p999-1001; Bailey 26/e p1159-1160, 25/e p1176-1177; Shackelford 7/e p1021-1023)

Extensive involvement of small intestine by carcinoid tumor is associated with higher probability of liver (not the lung) metastasis.

- MC malignant tumor of small intestine: **Carcinoid > Adenocarcinoma**^Q.
- Carcinoid tumors have the **best prognosis** of all **small bowel tumors**, whether the disease is localized or metastatic.
- Resection of a carcinoid tumor localized to its primary site** approaches a **100% survival rate**^Q.
- Five-year survival rates** are about **65%** among patients with **regional disease** and **25% to 35%** among those with distant metastasis.
- Appendiceal carcinoids** are **more common in females**^Q.
- Extensive involvement of small intestine** is associated with **higher probability of liver metastasis**^Q

90. Ans. c. PR
 91. Ans. b. Constipation
 92. Ans. d. 5-HIAA
 93. Ans. d. Acute appendicitis
 94. Ans. b. Rectum is spared
 95. Ans. a. Associated with MEN-I, b. Serum chromogranin A is elevated, c. Urinary excretion of 5-HIAA is increased, e. Octreotide is used for treatment
 96. Ans. a. Foregut carcinoid-↑serotonin in blood, d. Midgut carcinoid-normal urinary 5-HIAA
 97. Ans. d. It is the most common malignancy of small intestine



98. Ans. b. Lung

SMALL INTESTINE TRANSPLANTATION

99. Ans. d. Majority of intestinal grafts are multivisceral grafts (Ref: Sabiston 19/e p682-689; Schwartz 10/e p352-354, 9/e p1010; Bailey 26/e p1429-1430, 25/e p1427-1428; Shackelford 7/e p1008-1012)

Small Intestinal Transplantation

- An alternative to lifelong IV nutrition is restoration of enteral absorptive function by intestinal replacement.

Three Varieties of Intestinal Transplantation

- Small bowel with or without a portion of the colon (SI)^Q
- Combined liver-small bowel grafts (LI)^Q
- Multivisceral grafts (MV)^Q

- Nearly equal numbers of SI and LI grafts have been reported, whereas only a few MV grafts have been performed (~10% of the total).

- MC indication for intestinal replacement: Inability to sustain successful TPN because of lack of IV access sites or severe complications from chronic TPN, such as liver failure^Q.

- Principal barrier to widespread application of intestinal replacement: Vigorous rejection response elicited by intestinal grafts due to large amount of gut-associated lymphoid tissue^Q.
- A uniquely dangerous consequence of intestinal transplant rejection is loss of the protective mucosal barrier of the gut, consequent bacterial translocation, and systemic sepsis in an immunocompromised host^Q.

- MC cause of death after small bowel transplantation is sepsis and multiorgan failure^Q.
- Because the intestine is the largest lymphoid organ in the human body, an intestinal graft can mount a formidable immune response against the host, GVHD^Q.

MISCELLANEOUS

100. Ans. a. Tricuspid valve endocarditis
 Shock, mesenteric artery thrombosis and volvulus can lead to gangrene of intestine.
 101. Ans. e. USG enteroclysis (Ref: Schwartz 10/e p1161,1163,1164, 9/e p1000, 1002, 1004; Shackelford 7/e p868, 884, 993)

Enteroclysis (Small Bowel Enema)

- Contrast is injected directly through **Frekas tube** directly into **distal duodenum**, filling the small bowel loops^Q.
- The opacified small bowel loops can be **imaged** then **using X-rays** (Barium enteroclysis), **CT** (CT enteroclysis) or **MRI** (MRI enteroclysis).^Q

Enteroclysis is Investigation of Choice in

- Partial, intermittent small intestinal obstruction^Q
- Small intestinal diverticula^Q
- Crohn's disease^Q

102. Ans. a. Whipple's disease, b. Abetalipoproteinemia, d. Agammaglobulinemia (Ref: Harrison 18/e p2468)

Disease That Can Be Diagnosed by Small-Intestinal Mucosal Biopsies	
Lesions	Pathologic Findings
Diffuse, Specific	
• Whipple's disease ^Q	• Lamina propria contains macrophages containing PAS + material
• Agammaglobulinemia ^Q	• No plasma cells; either normal or absent villi ("flat mucosa")
• Abetalipoproteinemia ^Q	• Normal villi; epithelial cells vacuolated with fat postprandially
Patchy, Specific	
• Intestinal lymphoma	• Malignant cells in lamina propria and submucosa
• Intestinal lymphangiectasia	• Dilated lymphatics; clubbed villi
• Eosinophilic gastroenteritis	• Eosinophil infiltration of lamina propria and mucosa
• Amyloidosis	• Amyloid deposits
• Crohn's disease	• Noncaseating granulomas
• Infections	• Specific organisms
• Mastocytosis	• Mast cell infiltration of lamina propria
Diffuse, Nonspecific	
• Celiac disease	• Short or absent villi; mononuclear infiltrate; epithelial cell damage; hypertrophy of crypts
• Tropical sprue	• Similar to celiac disease
• Bacterial overgrowth	• Patchy damage to villi; lymphocyte infiltration
• Folate deficiency	• Short villi; decreased mitosis in crypts; megalocytosis
• Vitamin B ₁₂ deficiency	• Similar to folate deficiency
• Radiation enteritis	• Similar to folate deficiency
• Zollinger-Ellison syndrome	• Mucosal ulceration and erosion from acid
• Protein-calorie malnutrition	• Villous atrophy; secondary bacterial overgrowth
• Drug-induced enteritis	• Variable histology

103. Ans. d. Ileum

104. Ans. d. All

105. Ans. a. Omental bursa

106. Ans. b. Associated with liver fibrosis (Ref: www.emedicine_hlml/cocoon)

Idiopathic Sclerosing Encapsulating Peritonitis (Abdominal cocoon)

- It is a rare condition of **unknown cause** in which **intestinal obstruction** results from the **encasement of variable lengths of bowel** by a **dense fibrocollagenous membrane** that gives the appearance of a **cocoon**.^Q

Causes of Secondary cocoon

- | | |
|---|---|
| <ul style="list-style-type: none"> • Previous abdominal surgery or peritonitis^Q • Chronic ambulatory peritoneal dialysis (CAPD)^Q • Prolonged use of beta-blocker propranolol^Q | <ul style="list-style-type: none"> • Use of providone iodine for abdominal wash out • Placement of Lee Veen shunt for refractory ascites^Q • SLE^Q |
|---|---|

Clinical Features

- Occurrence of **intestinal obstruction** in a relatively **young girl** without an **obvious cause**^Q
- **History of similar episodes** that resolved **spontaneously**^Q
- **Abdominal pain** and **vomiting**^Q
- Presence of a **non tender soft mass** on abdominal palpation
- Features of **increasing abdominal distension**, **jaundice** and features suggestive of liver pathology

Diagnosis

- Barium meal follow through: Serpentine configuration of dilated small bowel^Q
- CT scan is helpful

Treatment

- Laparotomy with **removal of the membrane**, after which recovery is usually complete.

107. Ans. b. Jejunum (Ref: Ganong 23rd/2341)

- **Maximum water absorption** from GIT occurs in **jejunum**^Q (5500 ml) > **Ileum** (2000 ml) > **Colon** (1300 ml).

Small intestine (Anatomy and Physiology)

- **Duodenum: 20 cm; Jejunum: 100 cm; Ileum: 150 cm**^Q
- **Largest endocrine organ** of the body: **Small bowel**^Q
- **Strongest component** of small intestine: **Submucosa**^Q (used for manufacturing **catgut sutures**)
- **Pacemaker of small bowel** is located in: **Duodenum**^Q
- Proximal bowel (jejunum) **absorbs: Calcium, iron, folate and fats**^Q
- Distal bowel (ileum) **absorbs: Bile salts, vitamin B12**^Q

108. Ans. d. Distal part of duodenum has a cap (Ref: BDC 4th/vol II/251)

The first part of duodenum has duodenal cap or bulb, not the distal part.

Small Intestine Radiography

- The **first part of duodenum** is visible as a **triangular shadow** on barium studies known as **duodenal cap**^Q.
- The **small intestine** contains **mucosal folds** known as **plicae ciculares** or **valvulae conniventes**^Q that are visible on barium studies and help in the distinction between small intestine and colon.
- **Colon** can be identified by the presence of **haustrations**^Q.
- **Valvulae conniventes** are **more prominent in jejunum** giving the 'feathery'^Q appearance on barium. These **mucosal folds** are **gradually reduced distally** giving 'featureless' appearance of distal ileum^Q.

109. Ans. a. Uterus, b. Left colon, c. Urinary bladder (Ref: BDC 4th/vol II/221)

Pain in Hypogastrium and Pelvis

- Common causes of pain in this area include **rectal disease** (rectal cancer, proctitis), **bladder diseases** (stones, cystitis, carcinoma), and **uterus** (salpingo-oophoritis, uterine cancer) in females.

110. Ans. c. 6 weeks (Ref: Bailey 25/e p1288)

- **Spontaneous obliteration** of omphalomesenteric or vitellointestinal duct occurs **before the 6th week** of intrauterine life^Q.

111. Ans. a. Malabsorption (Ref: Harrison 18/e p944)

Immunoproliferative Small-Intestinal Disease (IPSID)

- IPSID is recognized as an **infectious pathogen-associated human lymphoma** that has **association with Campylobacter jejuni**^Q.
- It involves **mainly the proximal small intestine** resulting in **malabsorption, diarrhea, and abdominal pain**^Q.
- IPSID is associated with **excessive plasma cell differentiation** and **produces truncated alpha heavy chain proteins lacking the light chains** as well as the **first constant domain**^Q.

Treatment

- **Early-stage IPSID** responds to **antibiotics (30–70% complete remission)**^Q.
- **Most untreated IPSID** patients progress to **lymphoplasmacytic and immunoblastic lymphoma**^Q.
- **Patients not responding to antibiotic therapy** are considered for treatment with **combination chemotherapy** used to treat low-grade lymphoma^Q.

Large Intestine

MULTIPLE CHOICE QUESTIONS

HIRSCHSPRUNG'S DISEASE

- True about Hirschsprung's disease:** (PGI May 2010, Dec 2008)
 - Aganglionic segment is contracted not dilated
 - Descending colon is most common site of aganglionosis
 - Barium enema is diagnostic
 - It is seen in infants and children only
 - Barium enema show calcification
- Duhamel's operation is done for:** (MHSSMCET 2005)
 - Hirschsprung's disease
 - Meconium ileus
 - Annular pancreas
 - Imperforate anus
- Hirschsprung's disease is best diagnosed by:** (All India 2012, AIIMS GIS Dec 2011)
 - Rectal biopsy
 - Anal manometry
 - CT
 - MRI
- Not true regarding Hirschsprung's disease is:**
 - Autosomal dominant (Recent Question 2015; AIIMS Nov 97)
 - Absent ganglionic cells in myenteric plexus
 - Absent ganglionic cell in submucous plexus
 - Rectal biopsy is diagnostic
- Aganglionic segment is encountered in which part of colon in case of Hirschsprung's disease?** (Recent Question 2014; AIIMS Nov 99)
 - Distal to dilated segment
 - In whole colon
 - Proximal to dilated segment
 - In dilated segment
- Hirschsprung's disease involves which region of intestine?** (MCI March 2008)
 - Colon
 - Rectum
 - Rectosigmoid part
 - Terminal ileum
- Treatment of choice in a child with short segment Hirschsprung's disease with minimal symptoms:**
 - Conservative treatment
 - Extended myectomy
 - Swenson operation
 - Duhamel's operation
- Hirschsprung's disease:** (PGI June 2002)
 - Is seen in infants and children only
 - Absence of ganglia in involved segment
 - The involved segment is the dilated colon
 - Bleeding PR is a presenting feature
 - Surgery is used in therapy

- True about Hirschsprung's disease:** (PGI June 2001)
 - Pathology of myenteric plexus of Auerbach
 - Blood in stools
 - May involve small intestine rarely
 - Involved segment of intestine is dilated
 - Present only in infant and children

- Investigation of choice in Hirschsprung's disease is:** (AIIMS Nov 2005, DNB 2005, 2000, PGI Dec 98)
 - Rectal manometry
 - Rectal examination
 - Rectal biopsy
 - Ba enema

- True statements about congenital megacolon include all of the following except:** (All India 97)
 - Dilatation and hypertrophy of pelvic colon
 - Loud borborygmi
 - Symptoms appear within 3 days following birth
 - Large stool

- Hirschsprung's disease true are:** (PGI June 2006)
 - Sometimes found in adult
 - Dilated segment involved
 - Auerbach's plexus absent
 - Sometimes involve small intestine
 - Bleeding PR is usual presentation

- In Hirschsprung's disease, aganglionic segment is:** (DNB 2010)
 - Normal or dilated
 - Normal or contracted
 - Dilated or contracted
 - Always dilated

- Fecal soiling in children is most commonly due to:** (PGI June 99)
 - Hirschsprung's disease
 - Chronic constipation
 - Rectal atresia
 - None of the above

- Absence of ganglion in myenteric plexus is seen in:** (PGI June 97)
 - Crohn's disease
 - Ulcerative colitis
 - Hirschsprung's disease
 - Intussusception

- A newborn presented with bloated abdomen shortly after birth with passing of less meconium. A full thickness biopsy of the rectum was carried out. Which one of the following rectal biopsy findings is most likely to be present?** (All India 2005)
 - Fibrosis of submucosa
 - Hyalinisation of the muscular coat
 - Thickened muscularis propria
 - Lack of ganglion cells

17. Following procedures (except one) are done for correction of Hirschsprung's disease: (JIPMER 81, AIIMS 87)
- Duhamel's
 - Soave's
 - Swenson's
 - Bayar's
18. The operative treatment in Hirschsprung's disease is only undertaken when child: (PGI 79, TN 89)
- Is 2 years of age
 - Is at least 8 kg in weight and thriving
 - Has no distension of abdomen
 - Has failed to respond to conservative treatment
19. When rectal washouts are given to Hirschsprung's disease, the following fluid is used: (Karnataka 95)
- 5% dextrose
 - Normal saline
 - Soap solution
 - Tap water
20. All are features of congenital megacolon except: (All India 97)
- Large bulky stools
 - Tight anal ring
 - Pseudodiarrhoea
 - Failure to thrive
21. Hirschsprung's disease is treated by: (APPG 98)
- Colostomy
 - Excision of aganglionic segment
 - Colectomy
 - Sodium chloride wash
22. A 3 years old male child presents with history of constipation and abdominal distension for the last two years. The plain radiograph of abdomen reveals fecal matter containing distended bowel loops. A barium enema study done subsequently shows a transition zone at the recto-sigmoid junction with reversal of recto-sigmoid ratio. The most probable diagnosis is: (AIIMS Nov 2003)
- Anal atresia
 - Malrotation of the gut
 - Hirschsprung's disease
 - Congenital megacolon
23. Acquired diverticula are most commonly seen in: (Recent Question 2015; MHSSMCET 2007)
- Jejunum/ileum
 - Transverse colon
 - Sigmoid colon
 - Ascending colon
24. True about diverticulitis: (PGI June 2009)
- Occur at any age
 - Often incidental finding at operation
 - Young patient has more aggressive disease
 - Left sided colon involvement is more common
 - Operation is not done for all patients
25. True regarding colovesical fistula is: (JIPMER 2013)
- Commonly presents with pneumaturia
 - Barium enema is diagnostic
 - Common in Females
 - May be a surgical complication
26. Most common fistula in diverticulosis of colon" (MHSSMCET 2010, 2006)
- Colocutaneous
 - Colovaginal
 - Vesicovaginal
 - Colovesical
27. A 40 years old male patient presented with mild abdominal pain, mild constipation with a feeling of incomplete evacuation and mucus in stools for the past four years. On examination, tenderness is presenting left iliac fossa. The most likely diagnosis is: (AIIMS May 2012)
- Ulcerative colitis
 - Diverticular disease of colon
 - Irritable bowel syndrome
 - Carcinoma colon
28. Colonic diverticulosis is best diagnosed by: (Recent Question 2015; AIIMS May 2007)
- Colonoscopy
 - Nuclear scan
 - Barium enema
 - CT scan
29. Correct about diverticulosis is: (PGI June 98)
- Arise from diverticula of colon
 - Common in ileum
 - Protrusion of mucosa through muscular layers at point of blood vessel
 - All of the above
30. Massive colonic bleeding in a patient of diverticulosis is from: (All India 2000)
- Inferior mesenteric artery
 - Superior mesenteric artery
 - Celiac artery
 - Gastro-duodenal artery
31. In acute diverticulitis of the colon, the sigmoidoscopic finding is: (Kerala 87)
- Mucosa is inflamed
 - Minute diverticuli seen
 - Saw toothed appearance
 - Sigmoidoscope cannot be passed beyond 15 cm
32. Internal fistulas with colonic diverticulitis are most often:
- Colovesical
 - Coloenteric (PGI 81, 89)
 - Colocolonic
 - Colovaginal
 - Coloureteral
33. Diverticular disease is not common in: (Karnataka 94)
- Colon
 - Jejunum
 - Duodenum
 - Stomach
34. Which of the following about acute diverticulitis is incorrect? (DPG 2009 March)
- Sigmoid is the commonest site
 - Peri-colic abscess can occur
 - Fistulization is an emergency
 - Conservative treatment may be successful in severe attack
35. The most common site of bleeding diverticula is: (DPG 2008)
- Sigmoid colon
 - Descending colon
 - Rectum
 - Ascending colon
36. The term "Left sided appendicitis" as popularly called is nothing but:
- Diverticulitis
 - Ascending colitis
 - Descending colitis
 - Typhilitis
37. A obese old patient with diverticular disease if presents with perforation, what will the treatment of choice? (MHSSMCET 2005)
- Primary resection and anastomosis
 - Hartman's procedure
 - Conservative approach
 - Left Hemicolectomy
38. Hinchey classification is used in cases of: (MHCET 2016)
- Complicated diverticulitis
 - Complicated pancreatitis
 - Complicated hepatitis
 - Complicated meningitis
39. According to Hagitt's classification, a polyp invading neck in between head and stalk is level:
- 1
 - 2
 - 3
 - 4

COLORECTAL POLYPS

40. All are predisposing factor for colorectal carcinoma except: (AIIMS GIS 2003)

- a. Turcot's syndrome b. Muir-Torre syndrome
- c. Cowden's syndrome d. Juvenile polyposis coli

41. Intestinal polyps that can potentially grow into cancer: (DNB 2005, 2001, MHPGMCET 2007)

- a. Adenomatous polyp b. Hyperplastic polyp
- c. Juvenile polyp d. Hamartomatous polyp

42. Cowden's disease is characterized by the following except:

- a. Fibrocystic disease of breast and breast cancer
- b. Facial trichilemmomas (MHPGMCET 2007)
- c. Potentially malignant intestinal polyps
- d. Acral keratosis

43. Not associated with GI malignancy: (GB Pant 2011)

- a. Cowden's syndrome b. Peutz-Jegher's syndrome
- c. Juvenile polyposis d. Gardner's syndrome

44. All are true about risk factor for malignancy in polyp except:

- a. Pedunculated polyp b. > 2 cm (GB Pant 2011)
- c. Villous polyp d. Cellular atypia

45. Carcinoma of the colon develops in all patients with:

- a. Juvenile polyposis (COMEDK 2005)
- b. Hamartomatous polyps
- c. Inflammatory polyps
- d. Familial adenomatous polyposis

46. Diagnosis of colonic polyps is best done radiologically using: (COMEDK 2010)

- a. Barium meal series
- b. Double-contrast barium enema
- c. Instant enema
- d. Water-soluble contrast enema

47. Which polyp has maximum malignant potential?

(Recent Question 2015; AIIMS June 93)

- a. Sessile b. Pendunculated
- c. Superficial spreading d. Any of the above

48. Incidence of malignancy is maximum in: (AIIMS Feb 97)

- a. Villous adenoma b. Juvenile polyps
- c. Hyperplastic polyps d. Tubular adenoma

49. All the following statements regarding malignant potential of colorectal polyps are true except: (AIIMS Nov 2002)

- a. Polyps of the familial polyposis coli could invariably undergo malignant change
- b. Pseudopolyps of ulcerative colitis has high risk of malignancy
- c. Villous adenoma is associated with high risk of malignancy
- d. Juvenile polyps have little or no risk

50. True about neoplastic colorectal polyps: (PGI June 2003)

- a. Sessile polyps > 1 cm is malignant
- b. MC site is colon and rectum
- c. Adenomatous polyp is premalignant
- d. Tubular adenoma is malignant
- e. Pseudopolyps are premalignant

51. Which of the following polyps is not premalignant?

- a. Juvenile polyposis syndrome (PGI June 2003)
- b. Peutz-Jegher's syndrome
- c. Ulcerative colitis
- d. Familial polyposis coli
- e. Cronkhite Canada syndrome

52. All of the following are pre-malignant except:

- a. Crohn's disease (AIIMS November 2014)
- b. Ulcerative colitis
- c. Peutz-Jegher's syndrome
- d. Barrett's esophagus

53. Polyp associated with highest risk of malignant transformation is: (MHCET 2016)

- a. Juvenile
- b. Villous adenoma
- c. Tubular adenoma
- d. Polyp of Peutz-Jegher's syndrome

54. Which of the following colonic polyps is not premalignant?

- a. Juvenile polyps (All India 2006, AIIMS Nov 2006)
- b. Hamartomatous polyps associated with Peutz-Jegher's syndrome
- c. Villous adenoma
- d. Tubular adenomas

55. All the following polyps are premalignant except:

- a. Juvenile polyposis syndrome (All India 2007)
- b. Familial polyposis syndrome
- c. Juvenile polyp
- d. Peutz-Jegher's syndrome

56. In children MC type of polyp is: (PGI Dec 98)

- a. Juvenile polyp
- b. Solitary polyp
- c. Familial polyposis
- d. Multiple adenomatous polyp

57. Metabolic abnormality seen in large colorectal villous adenoma: (AIIMS May 2008)

- a. Hypokalemic metabolic alkalosis
- b. Hypokalemic metabolic acidosis
- c. Chlorine sensitive metabolic acidosis
- d. Chlorine resistant metabolic alkalosis

58. Lalita, a female patient presents with pigmentation of the lips and oral mucosa and intestinal polyps. Her sister also gives the same history. Most probable diagnosis is:

(DNB 2011, AIIMS June 2001, All India 2000)

- a. Carcinoid tumor b. Melanoma
- c. Villous adenoma d. Peutz-Jegher's syndrome

59. A 25 years old man has pigmented macules over the palms, soles and oral mucosa. He also has anemia and abdominal pain. Which one of the following is the most likely diagnosis? (WBPG 2015; APPG 2015)

- a. Incontinentia pigmenti
- b. Peutz - Jegher's syndrome
- c. Cushing's syndrome
- d. Albright's syndrome

60. Strong correlation with colorectal cancer is seen in:

(All India 2003)

- a. Peutz-Jegher's polyp b. Familial polyposis coli
- c. Juvenile polyposis d. Hyperplastic polyp

61. Prophylactic polypectomy is done in: (JIPMER 81)

- a. Peutz-Jegher's syndrome b. Gardner's syndrome
- c. Familial polyposis d. None of the above

62. On colonoscopy which of the following is highly malignant?

(JIPMER 98)

- a. Single pedunculated polyp
- b. Multiple flat polyps about hundreds
- c. Multiple pedunculated polyp
- d. Solitary flat polyp

FAMILIAL ADENOMATOUS POLYPOSIS

63. Which of the following is not true about FAP?

(AIIMS May 2011)

- a. AR inheritance
- b. Screening done by sigmoidoscopy
- c. Polyps develop in late adulthood
- d. Epidermal cysts and osteomas may occur

64. All are true about FAP except: (JIPMER GIS 2011)

- a. Gastric and duodenal polyps are most common
- b. Most of the gastric polyps represents fundal gland hyperplasia
- c. Increased risk of ampullary carcinoma
- d. CHRPE can be detected by ophthalmoscopy in 25% patients

65. Recommended treatment of FAP involving sigmoid colon: (AIIMS GIS Dec 2006)

- a. Total colectomy with ileorectal anastomosis
- b. Total colectomy with IPAA
- c. Segmental resection
- d. Total proctocolectomy with IPAA

66. Are true about FAP except: (AIIMS GIS Dec 2006)

- a. > 100 polyps for diagnosis
- b. Mutation in APC gene
- c. Budesonide prevent CA colon
- d. Endometrial carcinoma is a prominent association

67. Which is not true about familial polyposis? (AIIMS GIS May 2008)

- a. FAP: 100% risk of CRC cancer
- b. Juvenile polyposis: 20% risk of CRC cancer
- c. HNPCC: 30-60% risk of endometrium cancer
- d. Cowden's syndrome: 30% risk of CRC cancer

68. Most common associated cancer in FAP: (AIIMS GIS Dec 2009)

- a. CA pancreas
- b. Periampullary carcinoma
- c. CA thyroid
- d. Stomach

69. Which of the following is true about FAP? (GB Pant 2011)

- a. In stomach, most common are gastric adenomas
- b. Gastric carcinoma is common
- c. Duodenal carcinoma in 50% patients
- d. Duodenal adenoma in 60-90% patients

70. Gardner's syndrome is associated with all except: (PGI SS Dec 2009)

- a. Brain tumor
- b. Desmoid tumor
- c. Osteoma
- d. Abnormal dentition

71. "Gardner's syndrome" has all the following except: (COMEDK 2005)

- a. Colonic polyp
- b. Multiple epidermal cyst
- c. Bony exostosis
- d. Giant gastric folds

72. True about familial polyposis colon cancer syndrome except: (JIPMER 2011)

- a. Autosomal recessive
- b. Associated with fibroma and osteomas
- c. Associated with brain tumors
- d. 100% incidence of colon carcinoma

73. Turcot's syndrome is associated with: (PGI June 2002)

- a. Duodenal polyps
- b. Familial adenomatous polyposis
- c. Brain tumors
- d. Villous adenoma
- e. Hyperplastic polyps

74. The most common facial abnormality in Gardner's syndrome: (AIIMS Nov 2005)

- a. Ectodermal dysplasia
- b. Odontome
- c. Multiple osteomas
- d. Dental cysts

75. Gardner's syndrome is a rare hereditary disorder involving the colon. It is characterized by:

- a. Polyposis colon, cancer thyroid, skin tumors.
- b. Polyposis in jejunum, pituitary adenoma and skin tumors.

- c. Polyposis colon, osteomas, epidermal inclusion cysts and fibrous tumors of the skin
- d. Polyposis of gastrointestinal tract, cholangiocarcinoma and skin tumors.

76. Following genetic counseling in a family for Familial polyposis coli, next screening test is: (AIIMS Nov 2006)

- a. Flexible sigmoidoscopy
- b. Colonoscopy
- c. Occult blood in stools
- d. APC gene

77. All are true about Gardner's syndrome except: (SGPGI 2005)

- a. Protein losing enteropathy
- b. Always in 5th decade of life
- c. Small intestine polyp
- d. Malignancy is common

78. Desmoid tumor is associated with: (JIPMER 2014, 2013)

- a. Colonic polyps
- b. Pancreatic cancer
- c. Ovarian cancer
- d. Gastric cancer

79. All the following are True regarding Familial Adenomatous Polyposis except: (APPG 2015)

- a. It is due to a mutation of APC gene in chromosome 15
- b. > 100 colorectal polyps are present
- c. It is an autosomal dominant disorder
- d. Congenital Hypertrophy of Retinal Pigment Epithelium is seen in upto 50% patients

HEREDITARY NON-POLYPOSIS COLON CANCER

80. Lynch syndrome is also known as: (KGMC 2011)

- a. FAP
- b. PJS
- c. HNPCC
- d. Cowden's syndrome

81. Multiple cutaneous sebaceous adenomas are seen in: (All India 2011)

- a. Gardner's syndrome
- b. Turcot's syndrome
- c. Muir-Torre syndrome
- d. Cowden syndrome

82. Patient with proximal CA colon with endometrial and ovarian carcinoma has: (AIIMS GIS Dec 2006)

- a. Lynch syndrome
- b. Gardner's syndrome
- c. Cowden's disease
- d. Cronkhite-Canada syndrome

83. Amsterdam criteria includes all except: (AIIMS GIS Dec 2009)

- a. At least three relatives should be affected
- b. All the three should be first degree relative
- c. Two successive generations affected
- d. FAP excluded

84. Most common extra-intestinal malignancy in HNPCC: (AIIMS GIS May 2011)

- a. Pancreatic carcinoma
- b. CA stomach
- c. Small bowel carcinoma
- d. Transitional cell carcinoma

85. Most common mismatch repair gene mutation in HNPCC:

- a. MSH-2 and hMLH-1
- b. PMS-1
- c. MSH-6
- d. PMS-2

86. Microsatellite instability is most common in: (PGI SS June 2005)

- a. FAP
- b. HNPCC
- c. Sporadic colonic carcinoma
- d. Juvenile polyposis

RISK FACTORS COLORECTAL CANCER

87. Premalignant conditions is/are: (PGI Dec 2006)

- a. Ulcerative colitis
- b. Amoebic colitis
- c. Familial polyposis coli
- d. Juvenile polyp
- e. Peutz-Jegher's syndrome

88. Based on epidemiological studies, which of the following has been found to be most protective against carcinoma colon? (DNB 2011, AIIMS May 2011, All India 2009)

- a. High fiber diet b. Low fat diet
- c. Low selenium diet d. Low protein diet

89. Genetic abnormality in case of late adenoma to carcinoma in CA colon: (AIIMS GIS Dec 2009)

- a. APC b. K-ras
- c. DCC d. p53

90. All of the following genes may be involved in development of carcinoma of colon except: (All India 2009)

- a. APC b. Beta-Catenin
- c. K-ras d. Mismatch repair genes

91. Cholecystectomy may lead to increased risk of:

(COMEDK 2004)

- a. Proximal colon cancer
- b. CA. pancreas
- c. Hepatic cancer
- d. Cholangiocarcinoma

92. Dietary factors associated with colon carcinoma:

(PGI Dec 2002)

- a. High fiber
- b. Low fiber
- c. Smoked fish
- d. High fat intake
- e. Japanese are common to develop carcinoma colon

93. Which of these are associated with increased risk of colorectal carcinoma? (PGI June 2002)

- a. More intake of animal fat b. Aspirin
- c. Ulcerative colitis d. Amoebic colitis
- e. Polyps

94. Predisposing factors for colon carcinoma are: (PGI June 2002)

- a. Animal fat consumption
- b. Familial adenomatous polyposis
- c. Ulcerative colitis
- d. Crohn's disease
- e. TB

95. Commonly undergoing malignant transformation is/are:

(PGI June 2006)

- a. FAP b. Crohn's disease
- c. Ulcerative colitis d. Enteric colitis
- e. Juvenile polyp

96. Which among the following is not premalignant?

(PGI 99)

- a. Ulcerative colitis
- b. Peutz-Jegher's syndrome
- c. Villous adenoma
- d. Familial adenomatous polyposis

CARCINOMA COLON CLINICAL FEATURES AND DIAGNOSIS

97. Most common site of colonic carcinoma:

(GB Pant 2010, UPPG 2009; NEET 2013)

- a. Sigmoid b. Transverse
- c. Descending d. Ascending

98. Constricting type of colonic carcinoma is seen in:

(MHPGMCET 2001)

- a. Left colon b. Right colon
- c. Transverse colon d. Caecum

99. Most common site of carcinoma colon: (MHPGMCET 2008)

- a. Cecum b. Transverse colon
- c. Right colon d. Left colon

100. Patient having diarrhea and colic on and of with mass in right iliac fossa. Most probable diagnosis is: (DNB 2009)

- a. Carcinoma rectum
- b. Carcinoma cecum
- c. Carcinoma sigmoid
- d. Carcinoma transverse colon

101. Carcinoma of right colon presents as:

(PGI Dec 2006, June 2002)

- a. Anemia
- b. Mass in RIF
- c. Bleeding PR
- d. Alternate constipation and diarrhea
- e. Presents with obstruction

102. True about left sided colon carcinoma:

(PGI June 2001)

- a. Anemia
- b. Obstruction
- c. Melena
- d. Feculent vomiting
- e. Sigmoid spared

103. Features of left side carcinoma colon are:

(PGI June 2006)

- a. Anemia b. Obstruction
- c. Altered bowel habit d. Melena
- e. Feculent vomiting

104. Carcinoma right colon is most commonly of which type?

(AIIMS Nov 94, UPPG 2008)

- a. Stenosing
- b. Ulcerative
- c. Tubular
- d. Fungating

105. True regarding carcinoma colon is:

(AIIMS Nov 2000)

- a. Lesion on left side of the colon presents with features of anemia
- b. Mucinous carcinoma has a good prognosis
- c. Duke's A stage should receive adjuvant chemotherapy
- d. Solitary liver metastasis is not a contraindication for surgery

106. True about virtual colonoscopy:

(PGI June 2009)

- a. Have better image than conventional colonoscopy
- b. VC is performed by CT and MRI
- c. Take more time than conventional colonoscopy
- d. Easy to take tissue sample
- e. Helpful in pathology outside colon

107. Colonic disease can be diagnosed by all except:

(PGI May 2010)

- a. Virtual colonoscopy b. Ba enema
- c. Ba swallow d. Ba follow through
- e. Enteroclysis

108. Colonic metastases are related with:

(AIIMS GIS Dec 2010, 2011)

- a. Pre-op CEA level
- b. Depth of invasion
- c. Size of tumor
- d. Circumferential involvement

109. Which of the following is true about colon carcinoma?

(PGI SS Dec 2009)

- a. Inherited in 30% cases
- b. Synchronous lesion is seen in 1% cases
- c. Metachronous lesion is seen in up to 12% cases
- d. Carcinoma is inevitable in untreated cases of FAP

110. What is an acceptable screening technique for detecting recurrent colon cancer?

(COMEDK 2004)

- a. Screening sigmoidoscopy
- b. Screening the stool for occult blood
- c. Stool cytology
- d. Measurement of CEA levels

111. Most important prognostic factor for colorectal carcinoma is:

- Site of lesion (AIIMS May 2011)
- Tumour size and characteristics
- Age of patient
- Lymph node status

112. True about carcinoma colon: (PGI Dec 2002)

- 1/3rd of cases show liver metastasis
- Obstruction common in sigmoid colon
- CEA is useful for prognostic importance
- King's staging is done
- Alteration of bowel habit is common in CA left colon

113. True regarding cancer colon: (PGI Dec 2000)

- Obstructive features are more common with right colon
- 40% cases at presentation show liver metastasis
- Resection possible in 25% cases
- More common in AIDS patients

114. The tendency of colonic carcinoma to metastasize is best assessed by: (Recent Question 2014; AIIMS Nov 2003)

- Size of tumor
- Carcinoembryonic antigen (CEA) levels
- Depth of penetration of bowel wall
- Proportion of bowel circumference involved

115. Which of the following is true about colon carcinoma?

- Right sided colon carcinoma associated with young individuals (PGI Dec 2005)
- Most common site is sigmoid colon
- Right sided colon carcinoma present as chronic anemia
- Not resectable in case of metastasis
- Right sided colon has better prognosis than left sided colon

116. The incidence of carcinoma of the caecum in relation to colonic adenocarcinoma is:

- 2%
- 4.5%
- 20%
- 44%
- 62%

117. The best investigation for colorectal carcinoma: (Kerala 97)

- Exfoliative cytology
- Air contrast barium enema
- Ultrasound
- Colonoscopy and biopsy

118. Which of the following is the investigation of choice for diagnosing carcinoma colon? (MCI Sept 2005)

- X-ray abdomen
- CT scan
- Colonoscopy
- Barium enema

119. Tenesmus occurs in lesions of: (TN 90)

- Ileum
- Right side of colon
- Descending colon
- Sigmoid colon

120. The area of the colon which is least visualized by barium studies: (AIIMS 80, PGI 81)

- Sigmoid
- Hepatic flexure
- Splenic flexure
- Caecum

121. The commonest site of perforation during colonoscopy is: (UPSC 2000)

- Caecum
- Hepatic flexure
- Splenic flexure
- Sigmoid colon

122. A 58-year-old female complains of dull aching pain in right iliac fossa. On examination, gross pallor was found and a mass was palpable in right iliac fossa. What is the most likely diagnosis? (AIIMS November 2014)

- Appendicular mass
- Ileocecal tuberculosis
- Diverticulitis
- Carcinoma ascending colon

CARCINOMA COLON STAGING**123. Three lymph nodes in CA colon represents:** (KGMC 2011)

- IB
- II
- IA
- III

124. Stage IIIC in colorectal cancer: (GB Pant 2011)

- T2N0M0
- T2N1M0
- T2N2M0
- T4N1M0

CARCINOMA COLON TREATMENT**125. Management of carcinoma rectosigmoid with obstructive carcinoma in elderly frail:** (PGI Nov 2009)

- Colostomy
- Abdomino-perineal resection (APR)
- Resection and primary anastomosis
- Hartmann procedure
- Laser recanalisation

126. Treatment of carcinoma left colon with acute obstruction includes: (PGI June 2008)

- Hartman's procedure
- Left colectomy with anastomosis
- Proximal colostomy
- Extended right colectomy with ileoanal anastomosis
- Primary anastomosis should never be attempted

127. Treatment included in management of unresectable colorectal cancer liver metastases: (PGI May 2011)

- Portal vein embolization
- Resection
- Radiotherapy
- Staged operation
- Chemotherapy

128. In case of elective surgery of carcinoma sigmoid colon, which of the following should be done? (PGI June 2004)

- Mechanical bowel wash
- Broad spectrum antibiotic given 48 hours before operation
- Broad spectrum antibiotic at the time of operation
- None

129. After undergoing surgery, for carcinoma of colon a patient developed single liver metastasis of 2 cm. What you do next? (BIHAR PG 2014; All India 2002, All India 98)

- Resection
- Acetic acid injection
- Chemoradiation
- Radiofrequency ablation

130. A 60-years old man suffering from left colon carcinoma presented with acute left colonic obstruction the treatment is: (PGI June 2003)

- Primary resection and Hartman's procedure
- Defunctioning colostomy
- Right hemicolectomy
- Resection of whole left bowel and end to end anastomosis
- Conservative treatment

131. True about treatment of carcinoma left colon with acute obstruction: (PGI June 2008)

- Hartman's procedure
- Left colectomy with anastomosis
- Proximal colostomy
- Extended right colectomy with ileoanal anastomosis
- Primary anastomosis should never be attempt

132. Ramu is 60 years old male with CA descending colon presents with acute intestinal obstruction. In emergency department treatment of choice is: (AIIMS Nov 99, Nov 98, Feb 97)

- Defunctioning colostomy
- Hartman's procedure
- Total colectomy
- Left hemicolectomy

133. All the following are true regarding colorectal cancers except: (APPG 2016)

- Macroscopic variants are annular, tubular or cauliflower
- Left hemicolectomy is the treatment of choice for splenic flexure tumors
- Duke's classification was originally described for rectal tumors
- Arise from adenomatous polyp after genetic mutations influenced by environmental factors

COLONIC ISCHEMIA

134. Thumb printing appearance of colon on barium enema is seen in: (COMEDK 2004)

- Diverticulitis
- Ischemic colitis
- Ulcerative colitis
- Carcinoma colon

135. Are true about ischemic colitis except: (JIPMER GIS 2011)

- IMA is commonly occluded in cases needing aortic surgeries
- Ischemia is more common in small bowel as compared to large bowel
- Most common site of post ischemic stricture is sigmoid
- Transection of IMA doesn't need reimplantation if aortic surgery is attempted

136. Most common site of post ischemic stricture is: (JIPMER GIS 2011, GB Pant 2011, MHSSMCET 2010)

- Ascending colon
- Hepatic flexure
- Splenic flexure
- Sigmoid colon

137. Commonest site for ischemic colitis is: (AIIMS June 95, PGI Dec 97)

- Hepatic flexure
- Splenic flexure
- Descending colon
- Ascending colon

138. A 60-years old man presents with acute onset of pain in lower abdomen followed by repeated rectal bleeding. Examination revealed pulse rate of 100/minute, BP 160/96 mm of Hg and a localized tenderness in the left hypochondrium. Stools examination reveals only a few pus cells and sigmoidoscopy was normal. Which one of the following is the most likely diagnosis? (UPSC 96)

- Idiopathic ulcerative colitis
- Bacillary dysentery
- Ischemic colitis
- Amoebic colitis

PSEUDOMEMBRANOUS COLITIS

139. Psuedomembranous colitis is associated with: (COMEDK 2005)

- Campylobacter
- Clostridium difficile
- Clostridium retgari
- Salmonella typhi

140. Which among the following is the drug of choice for clostridium difficile-induced colitis? (COMEDK 2009)

- Gentamicin
- Ciprofloxacin
- Metronidazole
- Linezolid

141. A patient on antibiotics for treatment for peritonitis presents with mucus diarrhea. Most probable cause could be: (MCI Sept 2009)

- Ulcerative colitis
- Activation of latent tuberculosis
- Antibiotic associated diarrhea
- Gastritis

COLONIC RESECTION AND ANASTOMOSIS

142. After hemicolectomy, on the 6th post operative day patient developed serous discharge from the wound, following are to be done: (PGI Dec 2003)

- Dressing of the wound only
- Start IVF
- Do urgent laparotomy
- Do Ba-enema to see for anastomotic leak

143. On the 4th postoperative day of laparotomy a patient presents with bleeding and oozing from the wound. Management is: (PGI June 2006)

- Dressing of wound and observe for dehiscence
- IV fluids
- Send for USG abdomen
- Start treatments for peritonitis
- Urgent surgery

144. The appearance of anastomotic leakage following a low colonic anastomosis most often manifests: (PGI 80, AIIMS 85)

- 1-4 days
- 5-10 days
- 11-15 days
- 16-20 days
- None of the above

145. The most likely cause for suture leak after colon resection and anastomosis for cancer sigmoid is: (PGI 81, DPG 83)

- Subclinical malnutrition
- Infection of anastomotic site
- Mechanical disruption due to colonic pressure and contractility
- Ischemia

146. Cattle's maneuver is mobilization of: (MHSSMCET 2005)

- Sigmoid colon
- Descending colon
- Small bowel
- Caecum and ascending colon

147. Dunking maneuver is used in: (MHSSMCET 2009)

- Left hemicolectomy
- Right Hemicolectomy
- Right extended hemicolectomy
- Anterior resection

ENTERIC FISTULA

148. True about enterocutaneous fistula: (PGI Dec 2000)

- High output fistula drains 500 ml/day
- Malignancy is most common cause
- Fluid and electrolyte loss can occur
- No skin damage

149. Most common cause of colonic fistula in India at age of 27 years: (UPPG 2008)

- Crohn's disease
- Ulcerative colitis
- Tuberculosis
- Carcinoma rectum

LOWER GI BLEED

150. A 65-year-old man presented with an episode of syncope. He said he felt dizzy during defecation and noticed gross bleeding in the pan. Fecal occult blood test done 3 months ago as a part of routine screening for colon cancer was negative. There is no history of recent weight loss. What is the likely colonoscopic finding? (AIIMS November 2014)

- Early stage carcinoma colon
- Sigmoid diverticulitis
- Microscopic colitis
- Dilated mucosal and submucosal veins in the colon

- 151. Heyde's syndrome is:** (COMEDK 2010)
 a. Mitral stenosis, arthritis and biliary cirrhosis
 b. Mitral regurgitation, hiatus hernia and cirrhosis
 c. Aortic stenosis, gastrointestinal bleeding and angiodysplasia of colon
 d. Pulmonary arterial hypertension, tricuspid regurgitation and cirrhosis
- 152. First investigation to be done in a patient with recurrent fecal occult blood loss:** (MHSSMCET 2006)
 a. Esophagogastroscope b. Colonoscopy
 c. Barium enema d. Close Observation
- 153. Most common cause of heavy bleeding in 70 years old male:** (Recent Question 2014; KGMU 2011)
 a. Colorectal carcinoma b. Colonic diverticulosis
 c. Polyp d. Angiodysplasia
- 154. False about vascular ectasia:** (AIIMS GIS 2003)
 a. Associated with cutaneous lesions
 b. The bleed is usually small and recurrent and never massive
 c. The treatment may involve subtotal colectomy in some cases
 d. Associated with aortic stenosis
- 155. Which of the following is the least common possibility about angiodysplasia of colon?** (Recent Question 2015)
 a. Involvement of cecum
 b. Involvement of rectum in 50% of cases
 c. Affecting age group > 40 years
 d. Cause of troublesome lower GI haemorrhage
- 156. Most common cause of lower GI bleed in India is:** (AIIMS Nov 94)
 a. Benign tumour b. Non specific ulcer
 c. Cancer rectosigmoid d. Hemorrhoids
- 157. Painless lower GI bleed is seen in child with:** (PGI Dec 2000)
 a. Meckel's diverticulum b. Rectal polyp
 c. Anal fissure d. Acute Appendicitis
- 158. A patient presents with lower gastrointestinal bleed. Sigmoidoscopy shows ulcers in the sigmoid. Biopsy from this area shows flask-shaped ulcers. Which of the following is the most appropriate treatment?** (AIIMS Nov 2005)
 a. Intravenous ceftriaxone
 b. Intravenous metronidazole
 c. Intravenous steroids sulphasalazine
 d. Hydrocortisone enemas
- 159. Following is least common about angiodysplasia of colon:**
 a. Involvement of cecum (All India 96)
 b. Involvement of rectum in 50% of cases
 c. Affecting age group > 40 years
 d. Cause of troublesome lower G.I. hemorrhage
- 160. The most useful investigation for profuse lower gastrointestinal bleeding is:** (UPSC 2005)
 a. Proctosigmoidoscopy
 b. Colonoscopy
 c. Double contrast barium enema
 d. Selective arteriography
- 161. Most common cause of lower gastro intestinal bleeding is:** (UPPG 2007)
 a. Diverticulosis
 b. Colorectal carcinoma
 c. Angiodysplasia
 d. Anal fissure
- 162. The commonest cause of significant lower gastrointestinal bleed in a middle aged person with unknown reason is:** (DPG 2009 March)
 a. Sigmoid diverticula b. Angiodysplasia
 c. Ischemic colitis d. Ulcerative colitis
- 163. Most common site of angio dysplasia is:** (DNB 2007)
 a. Sigmoid colon b. Transverse colon
 c. Ascending colon d. Descending colon
- 164. All of the following are cause of blood in stools in children except:** (AIIMS 85)
 a. Meckel's diverticulum b. Carcinoma
 c. Intussusception d. Juvenile polyp
- 165. The commonest cause of significantly lower gastrointestinal bleed in a middle aged person without any known precipitating factor may be due to:** (MCI March 2008, Sept 2010)
 a. Ulcerative colitis
 b. Ischemic colitis
 c. Angiodysplasia
 d. Diverticulum of sigmoid colon
- 166. Massive bleeding per rectum in a 70 years old patient is due to:** (DNB 2005, 2000, All India 2000)
 a. Diverticulosis b. Carcinoma colon
 c. Colitis d. Polyps
- 167. Guaiac test is used for:** (PGI 82)
 a. Pentosuria b. Fructosuria
 c. For occult blood in stool d. Pancreatitis

BOWEL PREPARATION

- 168. Full bowel preparation is avoided in all, except:** (AIIMS June 94)
 a. Carcinoma colon b. Hirschsprung's disease
 c. Ulcerative colitis d. Irritable bowel syndrome
- 169. Complete bowel preparation is done in a case of:** (AIIMS Nov 99)
 a. Colonic carcinoma b. Hirschsprung's disease
 c. Irritable bowel disease d. Ulcerative colitis
- 170. Agent not used for bowel preparation:** (AIIMS GIS May 2011)
 a. Metronidazole b. Polymyxin
 c. Erythromycin d. Neomycin

LARGE INTESTINE ANATOMY AND PHYSIOLOGY

- 171. What is epiploic node?** (APPG 2008)
 a. Node draining colon
 b. Adjacent to aorta
 c. Epitracheal node
 d. None
- 172. True about colonic organisms is:** (PGI Dec 98)
 a. Distal ileum 10^3 – 10^5 organisms
 b. Colon 10^{10} – 10^{11} organisms
 c. First organism in new born is coliforms and streptococcus
 d. Chyme in jejunum contains many bacteria
- 173. Antiperistalsis is seen in:** (AIIMS 91)
 a. Distal colon b. Jejunum
 c. Proximal colon d. Ileum
- 174. Mass movement of the colon would be abolished by:** (COMEDK 2005)
 a. Extrinsic denervation
 b. Distension of the colon
 c. Gastrocolic reflex
 d. Destruction of Auerbach's plexus

175. Which of the following is the terminal group of lymph node for colon? (AIIMS May 2011)

- a. Paracolic
- b. Epicolic
- c. Preaortic
- d. Ileocolic

176. Which of the following is not degraded by colonic flora? (AIIMS May 2011)

- a. Pectin
- b. Lignin
- c. Starch
- d. Glucose

MISCELLANEOUS

177. A patient suffered bullet injury to left side of the colon and presented in the casualty department after 12 hours. What will be the management? (AIIMS Nov 2000)

- a. Proximal defunctioning colostomy
- b. Primary closure

- c. Proximal colostomy and bringing out the distal end as mucus fistula
- d. Resection and primary anastomosis

178. Functional GI disorders can be differentiated from organic GI disorders by: (SGPGI 2005)

- a. Abdominal pain
- b. Diarrhea
- c. Tenesmus
- d. Bleeding PR

179. All are true about colonic lipoma except: (PGI SS June 2001)

- a. Squeeze sign on radiology
- b. Most common site is cecum
- c. Most commonly subserosal
- d. Most commonly submucosal

EXPLANATIONS

HIRSCHSPRUNG'S DISEASE

1. Ans. a. Aganglionic segment is contracted not dilated (Ref: Sabiston 19/e p1848-1849; Schwartz 10/e p1624-1626, 9/e p1435-1437; Bailey 26/e p1177, 25/e p1155-1156)

HIRSCHSPRUNG'S DISEASE

- Occurs in 1 out of every 5000 live births^Q
 - MC affected site: Rectosigmoid (75%)^Q > splenic flexure or transverse colon (17%) > Entire colon with variable extension into the small bowel^Q (8%)
- Increased Risk: Positive family history^Q and Down syndrome^Q

Pathogenesis

- Characterized pathologically by **absent ganglion cells** in the myenteric (Auerbach's) and submucosal (Meissner's) plexus with **hypertrophy of nerve trunks^Q** in the plexus
- Associated with **muscular spasm** of the **distal colon** and **internal anal sphincter** resulting in a **functional obstruction^Q**
- Abnormal bowel** is the **contracted distal segment**, whereas the **normal bowel** is the **proximal, dilated portion^Q**.

Clinical Presentation

Neonates	First few weeks of life	Otherwise healthy children and adults
<ul style="list-style-type: none"> Suspected in all neonates presenting with: <ul style="list-style-type: none"> Delayed passage of meconium beyond the first 24 hours of life^Q Abdominal distension following feeds^Q 	<ul style="list-style-type: none"> Suspected in any child presenting in first few weeks of life with: <ul style="list-style-type: none"> Gross abdominal distension^Q Chronic constipation^Q Failure to thrive^Q 	<ul style="list-style-type: none"> Short segment Hirschsprung disease should be suspected in otherwise healthy children and adults^Q presenting with: <ul style="list-style-type: none"> Severe constipation without fecal soiling^Q Faecal soiling is usually not a feature of this condition.

Digital Examination

- Rectum is **empty** on digital examination^Q
- Rapid expulsion of feces** often follows examination^Q
- Contracted rectal wall** can sometimes be appreciated by examining finger

Diagnosis

Rectal biopsy	Anorectal manometry	Radiology
<ul style="list-style-type: none"> Gold standard for the diagnosis of Hirschsprung's disease Confirms the diagnosis on demonstration of: <ul style="list-style-type: none"> Aganglionosis^Q Hypertrophic nerve fibres in the nerve plexus^Q 	<ul style="list-style-type: none"> Useful as a screening test^Q Rectoanal inhibitory reflex is absent^Q 	<ul style="list-style-type: none"> Water soluble contrast enema indicates the length and site of involved intestine. Important positive findings include: <ul style="list-style-type: none"> Coning down of transition zone Irregularity in mucosa Abnormal contraction of intestine

- Repeated tube decompression** and gentle **rectal washouts** with 30-50 ml of **normal saline** have a positive and significant clinical impact on these patients.

Treatment of Hirschsprung's Disease

Short segment disease	Long segment disease
<ul style="list-style-type: none"> Extended myectomy^Q removing a strip of rectal wall upto the area where normal ganglion cells start may be sufficient 	<ul style="list-style-type: none"> Temporary colostomy^Q for a few months to allow proximal intestine to return to its normal caliber followed by definitive procedures: <ul style="list-style-type: none"> Swenson^Q Duhamel^Q Soave^Q

Prognosis

- Excellent** overall survival
- MC post-operative problems**: **Constipation (MC)^Q** > soiling > incontinence > enterocolitis.

2. Ans. a. Hirschsprung's disease 3. Ans. a. Rectal biopsy 4. Ans. a. Autosomal dominant
 5. Ans. a. Distal to dilated segment 6. Ans. c. Rectosigmoid part 7. Ans. b. Extended myectomy
 8. Ans. b. Absence of ganglia in involved segment, e. Surgery is used in therapy
 9. Ans. a. Pathology of myenteric plexus of Auerbach, c. May involve small intestine rarely
 10. Ans. c. Rectal biopsy 11. Ans. d. Large stool
 12. Ans. a. Sometimes found in adult, d. Sometimes involve small intestine

HIRSCHSPRUNG'S DISEASE

- MC affected site: Rectosigmoid (75%)^Q > splenic flexure or transverse colon (17%) > Entire colon with variable extension into the small bowel^Q (8%)

13. Ans. b. Normal or contracted 14. Ans. b. Chronic constipation 15. Ans. c. Hirschsprung's disease
 16. Ans. d. Lack of ganglion cells 17. Ans. d. Bayar's
 18. Ans. b. Is at least 8 kg in weight and thriving (Ref: Schwartz 9/e p1436-1437)

- A diagnosis of Hirschsprung's disease requires surgery in all cases^Q.
- The classic surgical approach consisted of a multiple-stage procedure^Q.
- This included a colostomy in the newborn period, followed by a definitive pull-through operation after the child weighed > 10 kg^Q.

19. Ans. b. Normal saline

- Repeated tube decompression and gentle rectal washouts with 30-50 ml of normal saline^Q have a positive and significant clinical impact on these patients.

20. Ans. a. Large bulky stools 21. Ans. b. Excision of aganglionic segment
 22. Ans. c. Hirschsprung's disease

COLONIC DIVERTICULA

23. Ans. c. Sigmoid colon (Ref: Sabiston 19/e p1309-1310; Schwartz 9/e p1038-1041; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1879-1895)

COLONIC DIVERTICULA

- A diverticulum is an abnormal sac or pouch protruding from the wall of a hollow organ
- True diverticulum is composed of all layers of the intestinal wall^Q
- False diverticulum (pseudodiverticulum) lacks a portion of the normal bowel wall^Q.

- Acquired diverticula are the MC type^Q and are mainly false^Q diverticula
- MC site^Q of colonic diverticula: Sigmoid colon

Pathogenesis

- Diverticula are herniation of the mucosa through the muscularis propria

- Protrusion occurs at the point where the nutrient artery penetrates through the muscularis propria^Q, resulting in a break of the colonic wall, mainly on mesenteric side

- In some cases, the arteriole penetrating the wall can be displaced over the dome of diverticulum which results in massive hemorrhage^Q

- Another factor is increased intraluminal pressure^Q, diets low in fiber reduce the stool bulk which in turn leads to increased peristaltic activity, particularly in the sigmoid colon. This increases the intraluminal pressure.

- Diverticulosis is more common in the western world^Q, it's rare in the underdeveloped and developing countries, where diets include more fibre and roughage^Q.

- There is often a striking hypertrophy of the muscular layers of the colonic wall^Q associated with diverticulosis.
- This thickening of the colonic wall, most commonly affecting the sigmoid colon, may precede the appearance of diverticula^Q.

Diagnosis

- Barium enema is investigation of choice for colonic diverticulosis^Q.
- Thickening of the circular muscle fibres develops a concertina or saw-tooth appearance on barium enema^Q.

24. Ans. d. Left sided colon involvement is more common, e. Operation is not done for all patients (Ref: Sabiston 19/e p1310-1314; Schwartz 10/e p1201-1203, 9/e p1140; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1882-1886)

DIVERTICULITIS

- Diverticulitis is the **result of inflammation (perforation)** of colonic diverticulum^Q
- The **term** is somewhat **misnomer** because the **disease** is **actually an extraluminal pericolic infection** caused by the **extravasation of feces** through the **perforated diverticulum**^Q.

Complications

- Recurrent periodic inflammation and pain
- **Perforation** leading to general peritonitis or local (pericolic) abscess formation.
- **Intestinal obstruction**: In the **sigmoid** (as a result of **progressive fibrosis** causing **stenosis**) and in the **small intestine** (caused by **adherent loops** of small intestine on the pericolicitis)
- **Hemorrhage**: **Profuse colonic hemorrhage** in **17%** of cases, often requiring blood transfusions.

- **Bleeding in diverticulosis** may be **massive** but in about **80%** patients are **self limited** and **stop spontaneously**. These patients **do not require surgery**^Q

- **Fistula formation** (vesicocolic, vaginocolic, enterocolic, colocutaneous): **MC** is **vesicocolic**^Q

Clinical Features

- **Mild cases**: mDistension, flatulence and a sensation of heaviness in the lower abdomen
- **Emergency**: **Persistent lower abdominal pain**, usually in the **left iliac fossa**, with or without peritonitis, could be caused by diverticulitis.
- **Fever, malaise** and **leukocytosis** can differentiate diverticulitis from painful diverticulosis.
- The **sigmoid colon** is **often palpable, tender and thickened**^Q.
- **Any urinary symptoms** may herald the formation of a **vesicocolic fistula**, which leads to **pneumaturia**^Q (**flatus in the urine**) and even feces in the urine (**fecaluria**)^Q

Hinchey ^Q Classification of Sigmoid Diverticulitis	
Stage I	Pericolic or mesenteric abscess
Stage II	Walled-off pelvic abscess
Stage III	Generalized purulent peritonitis
Stage IV	Generalized fecal peritonitis

Diagnosis

- **CT scan**: Investigation of choice for diverticulitis^Q

Treatment

- Treatment is **mainly medical**^Q.

- **Younger patients** should be **treated in the same manner** as patients whose **first attack of diverticulitis** occurs **after the age of 50 years**^Q.
- There is **no difference** in **outcome or prognosis**^Q.

- Surgery done in elective setting is **sigmoid colectomy** with a **primary anastomosis**^Q.

Indications of Surgery in Diverticulitis
• Who do not improve on medical therapy ^Q
• Patients who have atleast two documented attacks ^Q of diverticulitis
• In all patients with complicated diverticulitis ^Q
• For recurrent or persistent hemorrhage ^Q

25. Ans. a. Commonly presents with pneumaturia 26. Ans. d. Colovesical
 27. Ans. b. Diverticular disease of colon
 28. Ans. c. Barium enema

- Investigation of choice for colonic diverticulosis: Barium enema^Q
- Investigation of choice for diverticulitis: CT scan^Q

29. Ans. a. Arise from diverticula of colon, c. Protrusion of mucosa through muscular layers at point of blood vessel
 30. Ans. b. Superior mesenteric artery (Ref: Sabiston 19/e p1175; Schwartz 9/e p1040; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1883-1884)

Although **diverticular disease** is much more common on the left side, **right-sided disease** is responsible for more than half episodes of **bleeding** (from SMA).

COLONIC DIVERTICULA

- **MC cause of significant lower GI bleeding: Diverticula^Q**
- **Bleeding** occurs in **3-15%** of individuals with diverticulosis
- **Bleeding** occurs at the **neck of the diverticulum** and is believed to be secondary to bleeding from the vasa recti as they penetrate through the submucosa.
 - Of those that bleed, **more than 75% stop spontaneously^Q**, although about **10% rebleed within 1 year** and almost **50% within 10 years**.
 - Although **diverticular disease** is much more common on the left side, **right-sided disease** is responsible for more than half episodes of **bleeding^Q**.
- **Best method of diagnosis and treatment: Colonoscopy^Q**
- **Epinephrine injection, electrocautery, endoscopic clips** have been successfully applied to **control the hemorrhage^Q**.
- If none of these maneuvers is successful or if hemorrhage recurs, **colonic resection** is indicated.
- **Blind hemicolectomy** is associated with **rebleeding in more than half** of patients,
- **Subtotal colectomy** does not eliminate the risk for **recurrent hemorrhage^Q**
- **Mortality rate of emergent subtotal colectomy** for bleeding: **30%^Q**

31. Ans. a. Mucosa is inflamed

32. Ans. a. Colovesical

33. Ans. b. Jejunum (Ref: Shackelford 7/e p1879)

INCIDENCE OF DIVERTICULA

- **Most common sites** of diverticula: **CMD PES JAI** (Colon >Meckel's >Duodenum >Pharynx >Esophagus >Stomach >Jejunum >Appendix >Ileum)^Q

34. Ans. c. Fistulization is an emergency (Ref: Sabiston 19/e p1313)

- Sabiston says "In diverticulitis, fistula between colon and bladder: a **fistula arising from the colon is rarely a cause for emergency surgery^Q**; infact, the **patient general condition is often improved** when the abscess fistulizes and drains. **Antibiotics** should be administered to reduce the adjacent cellulitis, and the **diagnostic steps** should be taken to confirm the cause of the fistula **before a definitive operation** is undertaken."

35. Ans. d. Ascending colon

36. Ans. a. Diverticulitis

37. Ans. b. Hartman's procedure (Ref: Sabiston 19/e p1313-1314)

GENERALIZED PERITONITIS AFTER DIVERTICULAR PERFORATION

- **Generalized peritonitis** resulting from diverticulitis can have two causes:
 - **Diverticular perforation into the peritoneal cavity** (perforation is not sealed by the body's normal defenses)
 - **Abscess bursts** into the unprotected peritoneal cavity
- In either situation, the result is an **overwhelming infection** that requires **immediate operative intervention^Q**.

Clinical Features

- **Diffuse abdominal tenderness**, with voluntary and involuntary guarding over the entire abdomen.
- **Elevated white blood count, fever, tachycardia, and hypotension^Q**.

Diagnosis

- **Abdominal X-ray or CT scans** may reveal **intrapertitoneal free air^Q**
- **Absence of extra-intestinal air** does not exclude the **diagnosis^Q**.

Treatment

- **Immediate laparotomy** is **mandatory^Q** to identify and excise the segment of colon containing the perforation.

- The **proper operation** in this situation is to **resect the diseased sigmoid colon, construct a colostomy** using noninflamed descending colon, and **suture the divided end of the rectum closed**. This procedure is called **Hartmann's operation^Q**.

- **Hartmann's operation** is the **most common technique** for **emergency operations** required for **control of infection secondary to diverticulitis^Q**.
- **Anastomosis** between the **descending colon** and **rectum** to restore intestinal continuity is done **after a period of at least 10 weeks^Q**.

38. Ans. a. Complicated diverticulitis

COLORECTAL POLYPS

39. Ans. b. 2 (Ref: Sabiston 19/e p1343; Shackelford 7/e p2030-2032)

HAGGITT'S CLASSIFICATION FOR POLYPS

- Haggitt's classification^Q for polyps containing cancer according to the depth of invasion
- By definition, all sessile polyps with invasive carcinoma are level 4 by Haggitt criteria.

Level	Depth of Invasion by Carcinoma
0	Does not invade the muscularis mucosa (carcinoma-in-situ or Intramucosal carcinoma) ^Q
1	Invades through the muscularis mucosa into the submucosa but is limited to the head of the polyp.
2	Invades the level of the neck of the polyp (junction between the head and the stalk) ^Q
3	Invades any part of the stalk ^Q
4	Invades into the submucosa of the bowel wall below the stalk of the polyp but above the muscularis propria ^Q .

40. Ans. c. Cowden's syndrome (Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p1205-1206, 9/e p1043; Bailey 25/e p631; Shackelford 7/e p2047)

- No increased risk of invasive gastrointestinal malignancy is seen in Cowden's syndrome^Q.

41. Ans. a. Adenomatous polyp (Ref: Sabiston 19/e p1342; Schwartz 10/e p1205-1206, 9/e p1042-1043; Bailey 26/e p1161-1164, 25/e p1177-1178; Shackelford 7/e p2030-2032)

Histological Classification of Colorectal Polyps	
Neoplastic Polyps	Non-neoplastic polyps
Adenomatous polyps or Adenomas: <ul style="list-style-type: none"> Tubular Tubulovillous Villous 	<ol style="list-style-type: none"> Hyperplastic polyps Hamartomatous polyps: <ul style="list-style-type: none"> - Juvenile polyps - PJS Inflammatory polyps

NON-NEOPLASTIC POLYPS

- Hyperplastic Polyps**
 - MC colorectal polyp^Q
 - Account for >90% of all colorectal polyps, mostly found in the **rectosigmoid**^Q.
 - Histologic appearance of these polyps is **serrated** (**saw-toothed appearance**)^Q
 - No malignant potential^Q
- Hamartomatous Polyps**
 - A hamartomatous polyp is a **localized overgrowth** of normal, mature intestinal epithelial cells.
 - Usually **lined with normal epithelium** over a submucosal core.
 - Juvenile polyps** are the MC type of colorectal hamartomas^Q

Juvenile polyps
<ul style="list-style-type: none"> Juvenile polyps are the MC type of colorectal hamartomas^Q Occur most commonly in children <5 years of age^Q. Up to 80% of juvenile polyps occur as a single lesion of the rectum^Q Typical symptoms are rectal bleeding, mucus discharge, diarrhea, and abdominal pain^Q. Also called retention polyps due to the inflammatory obstruction of the crypt necks that leads to cystic dilation of the mucus-filled glands. No increased risk of cancer^Q

Peutz-Jegher's Syndrome (AD)
<ul style="list-style-type: none"> PJS is also characterized by hamartomatous polyps^Q. Histological characteristics: Arborization and Pseudo-invasion^Q

- Inflammatory Polyps**
 - Inflammatory polyps** occur more frequently in **chronic ulcerative colitis**^Q, but are also seen in **Crohn's disease**^Q.
 - Inflammatory polyps have **no malignant potential**^Q and require **no treatment**^Q other than that of underlying colitis.

ADENOMATOUS POLYPS

- Most common neoplastic polyp is adenomatous, which harbors malignant potential^Q.
- Most colon cancers arise from adenomatous polyps (adenoma)^Q.
- Conditions associated with adenomatous polyps: Strong association with ureterosigmoidostomies^Q, acromegaly^Q and streptococcus bovis bacteremia^Q

Probability of development of malignancy depends upon:		
Gross Appearance of lesion	Histology	Size
<ul style="list-style-type: none"> • Pedunculated • Sessile (Increased risk)^Q 	<ul style="list-style-type: none"> • Tubular (MC)^Q • Tubulovillous • Villous (Highest risk)^Q 	<ul style="list-style-type: none"> • <1 cm • 1-2 cm • >2 cm (Increased risk)^Q

Adenomatous Polyps			
Types	Incidence	Villous tissue	Risk of Malignancy
Tubular	65-80% ^Q	<25%	5%
Tubulovillous	10-25%	25-75%	20%
Villous	5-10%	>75% ^Q	40% ^Q

42. Ans. c. Potentially malignant intestinal polyps (Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p292,1206, 9/e p1043; Bailey 26/e p129, 25/e p631; Shackelford 7/e p2047)

COWDEN'S DISEASE

- Characterized by multiple hamartomatous tumors arising from all three embryonal cell layers (ectoderm, mesoderm and endoderm), mucocutaneous lesions, developmental anomalies^Q and a predilection to develop breast and thyroid neoplasia.
- Polyps arise more commonly from ectodermal^Q rather than endodermal elements.

- MC feature: Multiple trichilemmomas^Q (type of benign hair shaft tumor)
- 2nd MC system involved: CNS
- Associated with megalencephaly, ataxia, epilepsy, dysplastic gangliocytoma of the cerebellum known as Lhermitte Duclos syndrome^Q.

- Polyps are typically small and occur from mouth to anus, but are observed most commonly in the colon^Q.
- Developmental disorders include high arched palate and adenoid facies, prominent forehead, hypoplastic mandible.
- Gene: PTEN gene (10q23.3)^Q

Associations

- Estimated lifetime risk of thyroid cancer (mainly FCT): 10%
- Estimated lifetime risk of breast cancer: 30-50%.
- No increased risk of invasive gastrointestinal malignancy^Q

43. Ans. a. Cowden's syndrome 44. Ans. a. Pedunculated polyp 45. Ans. d. Familial adenomatous polyposis
46. Ans. b. Double contrast barium enema (Ref: Harrison 18/e p770-771; Bailey 26/e p1162, 25/e p1181)

- Best investigation for diagnosis of colorectal polyps: Colonoscopy > Double-contrast barium enema^Q

SCREENING FOR COLORECTAL CANCER

- American Cancer Society suggests fecal Hemoccult screening annually and flexible sigmoidoscopy every 5 years beginning at age 50 for asymptomatic individuals^Q having no colorectal cancer risk factors.

- The American Cancer Society has also endorsed a "total colon examination" (i.e., colonoscopy or double-contrast barium enema) every 10 years as an alternative^Q to Hemoccult testing with periodic flexible sigmoidoscopy.

- Colonoscopy has been shown to be superior to double-contrast barium enema and also to have a higher sensitivity for detecting villous or dysplastic adenomas or cancers^Q than the strategy employing occult fecal blood testing and flexible sigmoidoscopy.

- Double-contrast barium enema is done when colonoscopy is contraindicated^Q.

- It is a **common** and **serious problem**^Q
- Precursor lesions exist^Q
- It is **slow growing**^Q
- **Testing is available**^Q

- ## CRONKHITE-CANADA SYNDROME

- It exhibits **autosomal dominant** inheritance
- Chromosome **19p13.3** encodes the serine threonine kinase **LKB1/STK11**.

Extra-intestinal Features

- Increased risk for **extra-intestinal cancer** of the **pancreas, thyroid, breast** (may be bilateral), lung, gall bladder, biliary tract (cholangiocarcinoma)^Q.
- Increased risk of **gynecologic malignancies** of the **ovary** (bilateral **sex cord tumors** with annular features) and **uterus** (**well-differentiated adenocarcinoma** of the cervix, known as **adenoma malignum**)^Q
- In men there is increased risk of **feminizing Sertoli cell tumors** of the testis.

60. Ans. b. Familial polyposis coli

61. Ans. d. None of the above

62. Ans. b. Multiple flat polyps about hundreds (Ref: Sabiston 19/e p1346-1347; Shackelford 7/e p2047)

RUVALCABA-MYHRE-SMITH SYNDROME

- Also referred to as **Bannayan-Zonana syndrome**^Q, Ruvalcaba-Riley smith syndrome, and Bannayan-Riley-Ruvalcaba syndrome
- Characterized by **hamartomatous polyposis** and **OLD HM-2**

OLD HM-2

- Ocular abnormalities, Lipomas, Developmental abnormalities
- Hashimoto's thyroiditis, Hyperpigmentation of penis.
- **Macrocephaly**, Mental retardation

- No increased risk of **colorectal carcinoma**, other **gastrointestinal** or **extraintestinal malignancy**^Q

FAMILIAL ADENOMATOUS POLYPOSIS

63. Ans. a. AR inheritance (Ref: Sabiston 19/e p1348-1349; Schwartz 10/e p1206-1207, 9/e p1043-1044; Bailey 26/e p1161-1162, 25/e p1177-1178; Shackelford 7/e p2033-2041)

FAMILIAL ADENOMATOUS POLYPOSIS (AD)

- FAP is an **autosomal dominant**^Q inherited syndrome
- Results in the development of **>100 adenomatous polyps**^Q.
- **Location of APC gene: Long arm** of chromosome 5q21.
- **Increased number** of polyps **predisposes** patients to a **greater risk of cancer**^Q.
- Accounts for **<1%** of all cases of CRC
- **Earliest phenotypic change** present is known as **aberrant crypt formation**^Q

- **Average age of adenoma development** in FAP is **15 years**^Q, with approximately 15% manifesting polyps by 10 years, 75% by 20 years, and 90% by 30 years of age.
- If left untreated, **colorectal cancer** develops in **nearly 100%** of these patients **by age 40 years**^Q.

Extra-intestinal Features

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • Osteomas (mandible and skull)^Q • Desmoid tumors^Q | <ul style="list-style-type: none"> • Thyroid papillary tumors • Medulloblastomas^Q • Hypertrophic gastric fundic polyps^Q | <ul style="list-style-type: none"> • CHRPE^Q • Benign dental abnormalities • Epidermoid cyst |
|--|---|--|

- Congenital hypertrophy of the retinal epithelium (CHRPEs) are **asymptomatic** and have **no malignant potential**; and are significantly **larger, multiple, bilateral** and with **mixed pigment** than sporadic CHRPE.

- **After CRC**, the **MC malignancy** diagnosed in patients with FAP is **periampullary adenocarcinoma** of **duodenum**^Q.
- **After the CRC** is eliminated by surgery, **periampullary tumors**^Q are **MC cause of death** among individuals with FAP.

- Others are tumors of the **brain, hepatoblastoma, adrenal gland, thyroid, pancreas, biliary tree, stomach, and small intestine.**

Diagnosis

- **Most common method** used to screen for APC mutations is the **APC gene testing** by **protein truncation test**^Q

- Protein truncation test **detects 80%** of **disease causing mutations** but **doesn't detect missense mutation**^Q.
- **Combination of protein truncation test** and **strand gel electrophoresis** has upto **90%** mutation **detection rate**^Q.

- **Direct DNA sequencing** is the **most accurate** method of detecting APC mutations, with **95% detection rate**^Q.
- If a disease causing **mutation** is **documented** in a **family**, the **accuracy** of the test **for other** at risk family members is almost **100%**.

- A **positive screening test** should be **confirmed with a diagnostic modality**
- Confirmatory tests include **direct DNA sequencing**, allele-specific oligonucleotide hybridization (ASO-hybridization), ASO amplification (ASO PCR), RFLP, and **ligase chain reaction**^Q.

Management

- After the **colorectal cancer** is eliminated by surgery, **periampullary tumors** are the **MC cause of death**^Q among individuals with FAP.
- **Prophylactic proctocolectomy** is recommended for patients with FAP, given the near **100% risk of early-onset CRC**^Q.
 - **Treatment of choice: Total proctocolectomy with ileal pouch–anal anastomosis (IPAA)**^Q.

SPIGELMAN'S CRITERIA

- Spigelman's criteria **predict the malignant risk of duodenal polyposis**^Q in patients with FAP and guide surveillance and management.
- Spigelman's criteria are determined by duodenal polyp **number, size, histology** and **dysplasia** (score: 0-12).

64. Ans. d. CHRPE can be detected by ophthalmoscopy in 25% patients

65. Ans. d. Total proctocolectomy with IPAA

66. Ans. d. Endometrial carcinoma is a prominent association (Ref: Shackelford 7/e p2038)

Endometrial carcinoma is a prominent association in HNPCC, not the FAP.

- Management of **duodenal polyps** in patients with FAP includes **medical intervention** (with NSAIDs such as sulindac), **endoscopic polyp ablation**, and **surgical resection**^Q.
- Sulindac has been used because of its **potential to stabilize**, and in some cases **reverse**, the **development of gastrointestinal neoplasia**, especially **colorectal adenomas**^Q.
- Sulindac is **most successful** in the treatment of **small (<1 cm) duodenal polyps**^Q

67. Ans. d. Cowden's syndrome: 30% risk of CRC cancer

68. Ans. b. Periampullary carcinoma

69. Ans. d. Duodenal adenoma in 60-90% patients (Ref: Shackelford 7/e p2037)

- Incidence of **duodenal polyps** in the patients with FAP: **90-100%**^Q
- Incidence of **duodenal carcinoma** in the patients with FAP: **0-5%**^Q

70. Ans. a. Brain tumor (Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p666,1207,1485, 9/e p1043-1044; Bailey 25/e p1177-1178; Shackelford 7/e p2035, 2055)

GARDNER'S SYNDROME (AD)

The combination of FAP with:

- **Bony lesions (osteomas**^Q, cortical thickening of long bones and ribs)
- **Benign lymphoid polyposis of ileum**^Q
- **CHRPE**^Q
- **Dental anomalies**^Q (impacted tooth, supernumerary tooth, dental cyst)
- **Desmoid tumors and sebaceous cyst**^Q

71. Ans. d. Giant gastric folds

72. Ans. a. Autosomal recessive

73. Ans. b. Familial adenomatous polyposis, c. Brain tumors (Ref: Sabiston 19/e p1346-1347)

TURCOT'S SYNDROME (AR)

- **MC brain tumors** are **medulloblastoma** and particularly **glioblastoma**.
- It is a **phenotypic variant** of FAP and is transmitted by an **autosomal recessive** gene.
- Turcot's syndrome kindreds fall into **two groups** based on their types of brain tumor and particularly genetic alteration.
- **Medulloblastoma** in FAP^Q
- **Glioblastoma multiforme** in HNPCC^Q

74. Ans. c. Multiple osteomas <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2635905/>

GARDNER'S SYNDROME (AD)

- **Skeletal abnormalities**, the **most common** of which are **osteomas**, are an essential component of Gardner syndrome.
- The **osteomas** are characterized by **slow, continuous growth**, and occur **most frequently** in the **mandible**^Q, the outer cortex of the skull and the paranasal sinuses.
- The **angle of the mandible** is a **particularly diagnostic site**^Q.

75. Ans. c. Polyposis colon, osteomas, epidermal inclusion cysts and fibrous tumors of the skin

76. Ans. d. APC gene

- **Most common method** used to screen for APC mutations is the APC gene testing by **protein truncation test**^Q

77. Ans. b. Always in 5th decade of life

78. Ans. a. Colonic polyps

79. Ans. a. It is due to a mutation of APC gene in chromosome 15

HEREDITARY NON-POLYPOSIS COLON CANCER

80. Ans. c. HNPCC (Ref: Sabiston 19/e p1349-1350; Schwartz 10/e p291-292,1183,1207, 9/e p1044; Bailey 26/e p1162-1164, 25/e p1178-1179; Shackelford 7/e p1753-1754)

HEREDITARY NONPOLYPOSIS COLORECTAL CANCER (AD)

- HNPCC is an **autosomal dominant**^Q inherited syndrome
 - **Defective mismatch repair genes** are located on chromosomes 2, 3 and 7^Q.
 - HNPCC is responsible for **3-5%**^Q of all cases of CRC.
- **Incidence of adenomas** in HNPCC and CRC is **similar** to that of the **general population** with sporadic CRC.
 - **Adenomas** in patients with HNPCC have **higher incidence** of **high-grade dysplasia** and **villous architecture**^Q.
 - Polyps in patients with HNPCC develop at a **younger age**, **larger** than general population and **distributed equally**^Q throughout colon.
- CRC are mostly **poorly differentiated** and **mucinous** and have **signet ring histology** and **"Crohn's like"** pattern of tumor infiltrating lymphocytes^Q.
 - Patients with HNPCC have **survival** that is **equivalent**, if not better than patients with **sporadic** CRC of similar stage.
 - **Predominance of right sided** colon cancer and increased incidence of **synchronous** and **metachronous** CRC.

- **Lynch syndrome I: CRC only**^Q
 - **Lynch syndrome II: CRC and associated malignancies**^Q

Diagnosis

- **Gold standard** for diagnosis of HNPCC is the detection of a **germline mutation** in **MMR gene**^Q.
- **Mismatch repair genes** associated with HNPCC: (hMLH1, hMLH3, hPMS1, hPMS2) and (hMSH2, hMSH3, hMSH6)^Q.

- **More than 90%** of cases are due to **mutation** in **hMLH1** or **hMSH2**^Q.

Extra-intestinal Features

- **Endometrial** (39-60%)^Q, **gastric** (13-19%)^Q, **ovarian** (6-12%)^Q, small intestine, pancreatic, thyroid, transitional cell epithelium of the urinary tract (renal pelvic, ureter, bladder); brain cancers.
- **MC extraintestinal feature: Endometrial cancer**^Q.
- HNPCC associated tumor of the CNS: **Glioblastoma**

- Association with benign and malignant **tumors** of the **sebaceous glands** and **keratocanthomas** is called **Muir-Torre syndrome**^Q.

81. Ans. c. Muir-Torre syndrome

82. Ans. a. Lynch syndrome

83. Ans. b. All the three should be first degree relative (Ref: Sabiston 19/e p1349; Schwartz 10/e p292, 9/e p1044; Shackelford 7/e p2041-2042)

REVISED AMSTERDAM CRITERIA

- The Revised Amsterdam criteria are used to select at-risk patients^Q (all criteria must apply).

Criteria

- Three or more relatives who are diagnosed with an HNPCC-associated cancer (colorectal, endometrium, small bowel, ureter, or renal pelvis) in which one affected person is a first-degree relative of the other two^Q
- At least two successive generations are affected^Q
- One or more cases of cancer are diagnosed before age 50 years^Q
- FAP has been excluded^Q, and tumors have undergone pathology review

- The Bethesda guidelines are established to direct patient selection for MSI testing^Q.

84. Ans. b CA stomach (Ref: Sabiston 19/e p1350; Schwartz 10/e p291-292, 9/e p1044; Shackelford 7/e p2043)

EXTRA-INTESTINAL MALIGNANCIES IN HNPCC

- Endometrial (39-60%)^Q > gastric (13-19%)^Q > ovarian (6-12%)^Q
- Rare Malignancies: Small intestine, pancreatic, thyroid, transitional cell epithelium of the urinary tract (renal pelvic, ureter, bladder); brain cancers.

85. Ans. a. MSH-2 and hMLH-1

86. Ans. b. HNPCC

RISK FACTORS COLORECTAL CANCER

87. Ans. a. Ulcerative colitis, c. Familial polyposis coli (Ref: Maingot 11th/626-629; Sabiston 19/e p1340-1342; Schwartz 10/e p291-292, 9/e p1041; Bailey 25/e p1179; Shackelford 7/e p2052-2058)

Risk Factors for the Development of Colorectal Cancer

1. Dietary Factors: <ul style="list-style-type: none"> High animal fat diet^Q Low fiber diet^Q Alcohol^Q 	3. Inflammatory bowel disease (Both UC and Crohn's disease)^Q
2. Hereditary syndromes: <ul style="list-style-type: none"> FAP^Q HNPCC^Q 	4. Streptococcus bovis bacteremia^Q
	5. Ureterosigmoidostomy^Q
	6. Smoking^Q
	7. Acromegaly^Q
	8. Pelvic irradiation^Q

CHEMOPREVENTION

- There is significant chemopreventive role of NSAIDs, Calcium carbonate, Selenium and Hormone replacement therapy in colorectal neoplasia^Q.

88. Ans. a. High fiber diet (Ref: Maingot 11/e p626-627; Schwartz 9/e p1041; Shackelford 7/e p2052)

- High fiber diet has been found to have protective effect by increasing the stool bulk, diluting the toxins, and reducing the colonic transit time and thus reducing exposure time to fecal carcinogens^Q.

89. Ans. d. p53 (Ref: Sabiston 19/e p1341; Schwartz 9/e p421; Shackelford 7/e p2051)

- The most frequently mutated tumor suppressor gene in human neoplasia is p53 (TP53), located on chromosome 17p^Q.
- Mutations in p53 are present in 75% of colorectal cancers and occur, rather late^Q in the adenoma-carcinoma sequence.

FEARON-VOGELSTEIN ADENOMA CARCINOMA MULTISTEP MODEL

- The earliest mutations in the adenoma-carcinoma sequence occur in the APC gene^Q. The earliest phenotype change present is known as aberrant crypt formation^Q and the most consistent genetic aberrations within these cells are abnormally short proteins known as APC truncations.
- Most APC truncation mutations occur in the mutational cluster region of the gene, an area responsible for beta-catenin binding^Q.
- Mutations in p53 are present in 75% of colorectal cancers and occur rather late^Q in the adenoma-carcinoma sequence.

90. Ans. b. Beta-Catenin (Ref: Sabiston 19/e p1338)

Gene Mutations that Cause Colon Cancer	
Mutation type	Genes Involved
Germline	• APC and MMR ^Q
Somatic	• Oncogenes: Myc, Ras, Src, erbB2 ^Q • Tumor suppressor genes: p53, DCC, APC ^Q • MMR genes: bMSH2, bMLH1, bPMS1, bPMS2, bMSH6, bMSH3 ^Q
Genetic polymorphism	• APC ^Q

ADENOMATOUS POLYPOSIS COLI (APC) GENE

- APC gene is a tumor suppressor gene located on chromosome 5q21^Q.
- Its product is 2843 amino acids in length and forms a cytoplasmic complex with GSK-3 β (a serine-threonine kinase), β -catenin, and axin^Q.

- APC participates in cell cycle control by regulating the intracytoplasmic pool of β -catenin^Q.
- APC influences cell cycle proliferation by regulating Wnt expression^Q.

- The Wnt signaling proteins are closely associated with the APC- β -catenin pathway.
- Under normal conditions, reduced intracytoplasmic β -catenin levels inhibit Wnt expression.
- When APC is mutated however, β -catenin levels rise, and Wnt is activated.

91. Ans. a. Proximal colon cancer (Ref: Maingot 11/e p628)

- Bile acids can induce hyperproliferation of the intestinal mucosa^Q via a number of intracellular mechanisms.

- Cholecystectomy, which alters the enterohepatic cycle of bile acids, has been associated with a moderately increased risk of proximal colon cancers^Q.

- It cannot be ruled out, however, that it is less the effect of the cholecystectomy than the impact of other, not yet identified factors in the lithogenic bile of such patients.
- A number of cofactors have been identified that may enhance or neutralize the carcinogenic effects of bile acids, e.g., the amount of dietary fat, fiber, or calcium^Q.
- Calcium, in fact, binds bile acids and thus may reduce their negative impact^Q.

92. Ans. b. Low fiber d. High fat intake, e. Japanese are common to develop carcinoma colon

93. Ans. a. More intake of animal fat, c. Ulcerative colitis, e. Polyps

94. Ans. a. Animal fat consumption, b. Familial adenomatous polyposis, c. Ulcerative colitis, d. Crohn's disease

95. Ans. a. FAP, b. Crohn's disease, c. Ulcerative colitis

96. Ans. b. Peutz-Jegher's syndrome

CARCINOMA COLON CLINICAL FEATURES AND DIAGNOSIS

97. Ans. a. Sigmoid (Ref: Bailey 26/e p1163, 25/e p1179)

Site of Carcinoma	Frequency
Rectum (MC) ^Q	38%
Sigmoid colon (2 nd MC) ^Q	21%
Cecum	12%
Transverse colon	5.5%
Ascending colon	5%
Descending colon	4%
Splenic flexure	3%
Hepatic flexure (LC) ^Q	2%

98. Ans. a. Left colon (Ref: Sabiston 19/e p1350-1353; Bailey 25/e p1179-1184; Shackelford 7/e p2051-2058)

CARCINOMA COLON

- Most common form of colon cancer is **sporadic**^Q in nature, without an associated strong family history.
- MC site of colon cancer: **Sigmoid**^Q
- MC site of metastasis: **Liver > Lung**^Q
- Mucin production worsens the **prognosis** since **mucin aids tumor extension**^Q

- Incidence of metastasis is related to **depth of invasion**^Q
- Chemotherapy regimen: **FOLFOX-IV (5-FU, Leucovorin, Oxaliplatin)**^Q

Clinical Features

- Symptoms of colonic carcinoma are **non-specific** and generally **develop** when the **cancer is locally advanced**^Q.

Symptoms associated with colon cancer	
<ul style="list-style-type: none"> • Abdominal pain (44%): MC^Q • Change in bowel habit (43%) 	<ul style="list-style-type: none"> • Hematochezia or melena (40%) • Weakness or malaise (20%)

Right Colon	Left Colon
<ul style="list-style-type: none"> • Fungating or cauliflower^Q type growth • Cancer may become quiet large without any obstructing symptoms due to relative liquid stool consistency^Q • Lesions ulcerate leading to chronic insidious blood loss^Q • Patients present with: <ul style="list-style-type: none"> - Melena, anemia, fatigue^Q - Abdominal pain^Q - Mass in right iliac fossa^Q • Good prognosis^Q as compared to left 	<ul style="list-style-type: none"> • Annular, constricting or stenosing growth^Q • Symptoms of obstruction is more common^Q • Patients present with: <ul style="list-style-type: none"> - Decrease in stool caliber^Q - Alteration of bowel habits (increasing constipation)^Q - Palpable lump^Q • Poor prognosis (more infiltrative)^Q

- Lesions of transverse colon are having **mixed symptoms of bleeding and obstruction**^Q.

Diagnosis:

- Barium enema: "Apple core" or "napkin ring" lesion, caused by a **constricting carcinoma**^Q

Colonoscopy
<ul style="list-style-type: none"> • Gold standard for diagnosis of colon cancer^Q. • Permits biopsy of the tumor to verify the diagnosis^Q • Inspect entire colon to exclude metachronous polyps or cancers^Q • Incidence of a synchronous cancer is about 3%^Q.

- Tumors causing complete obstruction: **Water-soluble contrast enema** is useful in to **establish** the **anatomic level** of the **obstruction**^Q.

99. Ans. b. Transverse colon

100. Ans. b. Carcinoma cecum

101. Ans. a. Anemia, b. Mass in RIF

102. Ans. b. Obstruction

103. Ans. b. Obstruction, c. Altered bowel habit

104. Ans. d. Fungating

105. Ans. d. Solitary liver metastasis is not a contraindication for surgery (Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1293-1294, 9/e p1123; Bailey 26/e p1084-1085, 1168, 25/e p1098-1099; Blumgart 5th/1290-1305; Shackelford 7/e p1585-1589)

COLORECTAL LIVER METASTASIS

- About 5-10% of these patients are candidates for a potentially **curative liver resection** with a **5-year survival rates** range from 25-58%^Q.
- About **two-third** of cases **recur**, but in high-risk situations (**four or more tumors, extrahepatic disease**), recurrence rates are generally 80% or higher^Q.
- **Synchronous liver metastasis** is associated with **poor prognosis**

- About **half** of the **recurrences** are isolated to the **liver** and a small number of these patients (5%) are candidates for a **second liver resection** and can expect further **5-year survival rates of 30-40%**.

- Resections of **extrahepatic metastases** that appear to be associated with the **best outcome** are **limited lung metastases**, **locoregional recurrences** of the primary tumor, and **portal lymph nodes**.

- For patients with **unresectable disease**, **preoperative chemotherapy** has been shown to **convert some patients** to **complete resection**.
- **Combinations of chemotherapy and complete resection** of hepatic metastases are associated with **long-term survival** in up to 50% of patients in modern series.

Factors most influential on outcome of Colorectal liver metastasis

1. Size **>5 cm^Q**
2. Disease free interval **<1 year^Q**
3. **More than one tumor^Q**
4. **Lymph node-positive** primary lesion^Q
5. CEA **>200 ng/mL^Q**

Contraindication to Liver Resection for Metastatic Colorectal Cancer (Ekberg Criteria)

- The presence of **four metastasis or more^Q**
- **Extrahepatic disease^Q**
- A resection margin of **<1 cm^Q**

106. Ans. a. Have better image than conventional colonoscopy, b. VC is performed by CT and MRI, e. Helpful in pathology outside colon (Ref: Harrison 18/e p771, 2422)

VIRTUAL COLONOSCOPY

- VC is a **medical imaging procedure** which uses **x-rays** and **computers** to produce **two- and three-dimensional images** of the colon and **rectum** and display them on a screen
- VC is **performed via CT** or with **MRI^Q**
- After the examination, the **images produced** by the scanner must be **processed into a 3D image^Q** (a cine program allows the user move through the bowel as if performing a normal colonoscopy).

- VC is used to **diagnose colonic polyps, diverticulosis and cancer^Q**.
- VC provides a **secondary benefit** of **revealing diseases or abnormalities outside the colon^Q**.

- VC provides **clearer, more detailed images** than a **barium enema^Q**
- Takes **less time** than either a conventional **colonoscopy** or **barium enema^Q**.

Disadvantages of Virtual Colonoscopy

- Radiologist **cannot take tissue samples (biopsy)** or **remove polyps^Q** during VC (conventional colonoscopy must be performed if abnormalities are found)
- VC performed **with CT** **exposes** the patient to **ionizing radiation^Q**

107. Ans. c. Ba swallow, d. Ba follow through, e. Enteroclysis

- **Barium swallow** is used for anatomical disorders of **esophagus^Q**.
- **Barium meal** is used for anatomical disorders of **stomach^Q**.
- **Barium meal follow through** is used for anatomical disorders of **small intestine^Q**.
- **Barium enema** is used for anatomical disorders of **large intestine^Q**.
- **Enteroclysis** is also known as **small bowel enema**, used for small intestine^Q.

108. Ans. b. Depth of invasion (Ref: Schwartz 9/e p1046; Shackelford 7/e p2133)

- **Incidence of metastasis** (hence **prognosis**) is **related to depth of invasion^Q**
- **No effect on Prognosis: Tumor size and duration** of symptoms^Q
- **Tumor size and configuration** (endophytic, exophytic, annular) **do not carry any prognostic significance^Q** in colorectal carcinoma.

109. Ans. d. Carcinoma is inevitable in untreated cases of FAP 110. Ans. a. Screening sigmoidoscopy

111. Ans. d. Lymph node status (Ref: Schwartz 10/e p1203-1216, 9/e p1046; Shackelford 7/e p2133-2134)

PROGNOSTIC FACTORS IN COLORECTAL CARCINOMA

- **Most important prognostic factor** for colorectal carcinoma: **Stage of the disease**^Q
- Single **most important independent prognostic factor** for colorectal carcinoma: **LN status**^Q
- The **stage of disease** gives information related to **depth of penetration** into bowel wall and **extent of regional node spread**, both of which are the two most important independent prognostic factors^Q.

NO EFFECT ON PROGNOSIS

- **No effect on Prognosis:** Tumor size and duration of symptoms^Q
- Tumor size and configuration (endophytic, exophytic, annular) **do not carry any prognostic significance**^Q in colorectal carcinoma.

112. Ans. a. 1/3rd of cases show liver metastasis, b Obstruction common in sigmoid colon, c. CEA is useful for prognostic importance, e. Alternate bowel habit is common in CA left colon (Ref: Schwartz 9/e p1048; Harrison 18/e p773)

- Schwartz: "Between 20-40% of patients who have undergone curative intent surgery for colorectal carcinoma eventually develop recurrent disease. While most of these patients will present with distant metastasis, a small proportion will have isolated local recurrence."
- Harrison: "Regardless of the clinicopathologic stage, a preoperative evaluation of the plasma CEA level predicts eventual tumor recurrence."

Factors Associated With a High Risk of Relapse for Colorectal Cancer

<ul style="list-style-type: none"> • Disease Stage^Q • High-Grade^Q tumor • Location (pelvis and splenic flexure^Q) • Obstruction/Perforation^Q 	<ul style="list-style-type: none"> • Venous invasion^Q • Perineural invasion^Q • Mucin production^Q • Diminished stromal immune reaction^Q 	<ul style="list-style-type: none"> • Aneuploidy^Q • p53 gene mutation^Q • Low microsatellite instability^Q • Age <30 year^Q
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113. Ans. d. More common in AIDS patients (Ref: CSDT 11th/723)

www.hiv.va.gov/provider/manual-primary.../cancer-screening.asp

- **Obstructive features** are more common with **left colon**.
- Approximately 10% lesions are **not resectable at the time of operation**, and an additional 20% of patients have **liver or distant metastasis** at the time of presentation. **Operation for cure** can be performed in rest of the 70% of patients.
- **HIV-infected** persons may be at slightly increased risk of CRC

114. Ans. c. Depth of penetration of bowel wall

115. Ans. b. Most common site is sigmoid colon, c. Right sided colon carcinoma present as chronic anemia, e. Right sided colon has better prognosis than left sided colon (Ref: Robbins 8/e p863)

- Left sided colon cancers are **more infiltrative** at the time of diagnosis than right lesions, associated with **poor prognosis**^Q.

116. Ans. None: Incidence of carcinoma in cecum is 12%^Q.

117. Ans. d. Colonoscopy and biopsy

118. Ans. c. Colonoscopy

119. Ans. d. Sigmoid colon

120. Ans. a. Sigmoid

121. Ans. d. Sigmoid colon (Ref: Shackelford 7/e p1747-1748; Harrison 18/e p2409)

RISKS ASSOCIATED WITH COLONOSCOPY

- Risks of colonoscopy: Perforation and hemorrhage^Q
- MC site of bleeding after colonoscopy: Stalk after polypectomy.
- MC site of perforation during colonoscopy: Sigmoid colon^Q
- Perforation can be caused by **excessive air pressure**, **tearing** of the antimesenteric border of the colon from **excessive pressure** on colonic loops, and at the sites of **electrosurgical applications**^Q

122. Ans. d. Carcinoma ascending colon

CARCINOMA COLON STAGING

123. Ans. d. III (Ref: Sabiston 19/e p1355; Shackelford 7/e p2134)

7 th AJCC: TNM Classification of Colorectal carcinoma	
Tis: Carcinoma in situ: intraepithelial or invasion of lamina propria	N1a: Metastasis in 1 regional LN
T1: Tumor invades submucosa	N1b: Metastasis in 2-3 regional LN
T2: Tumor invades muscularis propria	N1c: Tumor deposits in the subserosa, mesentery, or nonperitonealized pericolic or perirectal tissues without regional LN metastasis
T3: Tumor invades through the muscularis propria into pericorectal tissue	N2a: Metastasis in 4-6 regional LN
T4a: Tumor penetrates the surface of visceral peritoneum	N2b: Metastasis in 7 or more regional LN
T4b: Tumor directly invades or is adherent to other organs or structures	M1a: Metastasis confined to one organ or site (e.g. Liver, lung, ovary, non-regional node)
	M1b: Metastasis to more than one organ/site or the peritoneum

Stage Grouping					
IA	IIA: T3N0	IIIA	IIIB	IIIC	IVa: M1a
T1N0 T2N0	IIB: T4aN0 IIC: T4bN0	T1-T2, N1/N1c T1, N2a	T1-T2, N2b T2-T3, N2a T3-T4a, N1/N1c	T3-T4a, N2b T4a, N2a T4b, N1-N2	IVb: M1b

Modified Duke's Classification	
Stage	Description
A	Confined to the bowel wall^a
B1	Partially penetrated the muscularis propria^a
B2	Fully penetrated^a the muscularis propria
C1	Lymph node invasion without penetration of the entire bowel wall^a
C2	Lymph node invasion with penetration^a of the entire bowel wall
D	Distant metastasis^a

124. Ans. d. T4N1M0

CARCINOMA COLON TREATMENT

125. Ans. a. Colostomy, d. Hartmann procedure, e. Laser recanalisation (Ref: Maingot 11th/705; CSDT 11th/722; Sabiston 19/e p3154-3156; Schwartz 9/e p1048-1049; Bailey 26/e p1165-1169, 25/e p1181-1184; Shackelford 7/e p2060-2066)

- Maingot: "Hartmann's operation is an excellent palliative procedure done in elderly people who are not fit for major surgery like APR and also in locally advanced tumors^a."
- Unresectable rectal cancer can be palliated by fulguration (electrocoagulation) or laser photocoagulation^a.
- Diverting colostomy is performed for obstructing rectal cancer that cannot be resected^a.

Treatment of Large Bowel Obstruction	
Site of Obstruction	Procedure
Right-sided colonic obstruction (cancer or volvulus)	• Resection with ileo-transverse anastomosis^a
Cancer of sigmoid colon	• Hartmann's operation^a (sigmoidectomy with descending colostomy and closure of the rectal stump), • Sigmoidectomy with primary colorectal anastomosis^a • Abdominal colectomy with ileorectal anastomosis^a .
Cancer of distal or mid rectum	• Loop colostomy or defunctioning colostomy (to relieve obstruction) followed by neoadjuvant chemoradiation^a , (with the plan to resect the primary lesion at a later time)

126. Ans. a. Hartman's procedure, b. Left colectomy with anastomosis, c. Proximal colostomy, d. Extended right colectomy with ileoanal anastomosis
127. Ans. d. Staged operation, e. Chemotherapy (Ref: Sabiston 19/e p1460-1463)

COLORECTAL LIVER METASTASES

- With improved response rates to modern chemotherapy and advances in hepatic surgery, however, more patients are now candidates for hepatectomy^Q than in the past.
 - For patients with unresectable disease, preoperative chemotherapy has been shown to convert some patients to complete resection^Q.
 - Combinations of chemotherapy and complete resection of hepatic metastases are associated with long-term survival in up to 50% of patients in modern series.
- Complete resection of hepatic metastases appears to be a critically important treatment modality that is necessary for long-term survival^Q.

METASTATIC COLORECTAL CARCINOMA

- At present, only patients who have recurrence of colorectal carcinoma with defined isolated liver, lung, ovarian, or anastomotic metastasis should undergo surgery^Q.

Pulmonary Metastasis

- Prognostic factors include the number of metastases, size of the lesion, lymph node involvement, presence of additional metastatic sites and in some series pre-thoracotomy CEA levels.
- Neither primary disease free survival nor primary colorectal cancer stage significantly affect survival rates after thoracotomy.

Prophylactic Bilateral Oophorectomy

- Incidence of ovarian cancer with a history of colorectal cancer is five times, so the prevention of primary ovarian cancer in postmenopausal women is considered to be the main benefit.

128. Ans. a. Mechanical bowel wash, c. Broad spectrum antibiotic at the time of operation
129. Ans. a. Resection
130. Ans. a. Primary resection and Hartman's procedure, b. Defunctioning colostomy, d. Resection of whole left bowel and end to end anastomosis
131. Ans. a. Hartman's procedure, b. Left colectomy with anastomosis, c. Proximal colostomy, d. Extended right colectomy with ileoanal anastomosis
132. Ans. b. Hartman's procedure

Treatment of Colon Cancer According to Stage

Stage 0: (Tis, N0, M0)	• Endoscopic polypectomy for polyps containing carcinoma in situ
Stage I: (T1, N0, M0) Malignant Polyp	• Segmental colectomy ^Q
Stages I and II: (T1–3, N0, M0) Localized Colon Carcinoma	• Surgical resection ^Q
Stage III: (Tany, N1, M0) Lymph Node Metastasis	• Surgical resection+ Adjuvant chemotherapy ^Q (routinely) • Reference regimen: FOLFOX-IV ^Q (5-FU, Leucovorin, Oxaliplatin)
Stage IV: (Tany, Nany, M1) Distant Metastasis	• MC site of metastasis: Liver > Lung ^Q • Resection (metastasectomy) for isolated, resectable metastasis + adjuvant chemotherapy ^Q • Palliation for unresectable disease

Indications of adjuvant chemotherapy in Stage II

- Insufficient lymph node sampling^Q (<12 nodes resected with the specimen)
- Perivascular invasion^Q
- Poorly differentiated histology^Q
- Bowel obstruction or perforation^Q

CHEMOTHERAPY IN CA COLON

- FOLFOX-IV^Q (5-FU, Leucovorin, Oxaliplatin) is the **reference regimen** with **infusional 5-FU**
- Irinotecan based regimen should **not be used in the adjuvant setting**, as randomized data have shown increased toxicity and no long term benefit.
- Bevacizumab, cetuximab and panitumumab should also **not be used in the adjuvant setting**, as they add toxicity and expense, and do not add benefit.
- Irinotecan, bevacizumab and cetuximab are used for **systemic metastatic disease or stage IV^Q**.

POST-RESECTION FOLLOW-UP

- In candidates for resection of recurrent disease (e.x. hepatic resection) serum CEA testing should be performed **every 3 to 4 months** for 2 to 3 years after resection of the primary tumor. (The **half-life** of CEA is **7-14 days^Q**.)
- CEA is **most sensitive** for detection of **retroperitoneal and hepatic metastases^Q**.
- The rationale for colonoscopy is **not to define recurrent cancer**; the major rationale is to **define synchronous or metachronous bowel tumors**, usually polyps.
- Colonoscopy is recommended at **1 year after resection^Q**, and every **3 years** thereafter.

133. Ans. b. Left hemicolectomy is the treatment of choice for splenic flexure tumors

COLONIC ISCHEMIA

134. Ans. b. Ischemic colitis (Ref: Sabiston 19/e p1335-1337; Schwartz 9/e p1057; Bailey 26/e p1174, 25/e p1203; Shackelford 7/e p1866-1877)

COLONIC ISCHEMIA

- Intestinal ischemia occurs **most commonly** in the **colon^Q**.
- Unlike small bowel ischemia, **colonic ischemia is rarely associated with major arterial or venous occlusion^Q**.
- Most **colonic ischemia appears to result from low flow and/or small vessel occlusion^Q**.

- MC site of ischemic colitis: **Splenic flexure^Q**

- Ligation of the IMA during aortic surgery predisposes to **colonic ischemia^Q**.
- Splenic flexure is the **MC site^Q** of ischemic colitis (any segment of the colon may be affected)
- Rectum is relatively spared because of its **rich collateral circulation^Q**.

Risk factors for Colonic Ischemia

- | | |
|---|---|
| <ul style="list-style-type: none"> • Vascular disease^Q • Diabetes mellitus^Q | <ul style="list-style-type: none"> • Vasculitis^Q • Hypotension^Q |
|---|---|

Clinical Features

- Diagnosis of ischemic colitis is often based upon the **clinical history and physical examination^Q**.
- Mild ischemia: **Diarrhea** (usually bloody) **without abdominal pain^Q**.
- Severe ischemia: **Intense abdominal pain** (often out of proportion to the clinical examination), **tenderness, fever, and leukocytosis^Q**
- Peritonitis and/or systemic toxicity are signs of **full-thickness necrosis and perforation**.

Diagnosis

- Abdominal X-ray: **Thumb printing^Q** (due to **mucosal edema and submucosal hemorrhage^Q**).
- CT scan: Nonspecific **colonic wall thickening and pericolic fat stranding^Q**.
- Angiography is usually **not helpful^Q** because major arterial occlusion is rare.

- Sigmoidoscopy: Characteristic **dark, hemorrhagic mucosa^Q**
- Risk of precipitating perforation is **high**, so sigmoidoscopy is **relatively contraindicated^Q** in ischemic colitis.

Treatment

- Majority of patients with ischemic colitis **can be treated medically^Q**.
- Bowel rest and **broad-spectrum antibiotics** are the mainstay of therapy (**80% of patients recover^Q** with this regimen)

Indications of Surgery

- Failure to improve after 2 to 3 days of medical management^Q
- Progression^Q of symptoms
- Deterioration in clinical condition^Q

Complications

- Stricture (10-15%): MC site of stricture is sigmoid colon^Q
- Chronic segmental ischemia (15-20%).

135. Ans. d. Transection of IMA doesn't need reimplantation if aortic surgery is attempted (Ref: Sabiston 19/e p1335, 1705)

- Indeed, the IMA is frequently occluded in conditions requiring aortic surgery, and in such circumstances, transection of the IMA does not require reimplantation^Q. However, in this situation, the left colon is dependent on collateral blood supply, and transient hypotension at the time of the vascular procedure or immediately after surgery may result in ischemic injury to the vulnerable colonic mucosa.
- In aortic surgeries, the IMA is assessed for backbleeding. If there is strong backbleeding (stump pressure >40 mm Hg), the IMA is ligated close to the aorta or oversewn from within the sac. Poor backbleeding from the IMA is a sign of insufficient collateral circulation to the sigmoid colon, and reimplantation of the IMA with a patch of the aorta into the aortic limb is warranted^Q.

136. Ans. d. Sigmoid colon

137. Ans. b. Splenic flexure

Important Most Common Sites	
• Gastric ulcer ^Q	Lesser curvature (near incisura angularis)
• Peptic ulcer ^Q • Gastric outlet obstruction ^Q	1 st part of duodenum
• Small bowel ^Q adenocarcinoma • Atresia ^Q	Duodenum
• Polyps in PJS ^Q • Pneumatosis intestinalis ^Q	Jejunum
• Crohn's disease ^Q • Fistula, perforation and carcinoma in Crohn's disease ^Q • Typhoid ulcer ^Q • Tubercular ulcer ^Q • Small intestinal lymphoma ^Q • Gall stone ileus ^Q	Terminal Ileum
• Amebic colitis ^Q • Bleeding in angiodysplasia ^Q • Bleeding in colonic diverticula ^Q	Cecum and ascending colon
• Ischemic colitis ^Q	Splenic flexure
• Colonic diverticula ^Q • Stricture after ischemic colitis ^Q • Volvulus ^Q	Sigmoid
• Ulcerative colitis ^Q • Colorectal cancer ^Q • Hirschprung's disease ^Q	Rectum

138. Ans. c. Ischemic colitis

PSEUDOMEMBRANOUS COLITIS

139. Ans. b. Clostridium difficile (Ref: Sabiston 19/e p1334-1335; Schwartz 10/e p1222, 9/e p1057; Bailey 26/e p1159, 25/e p1165)

PSEUDOMEMBRANOUS COLITIS

- PMC is caused by *C. difficile*, a gram-positive^Q bacillus.
- *C. difficile* colitis is the leading cause of nosocomially acquired diarrhea^Q.

Pathogenesis

- Colitis is thought to result from overgrowth of this organism after depletion of the normal commensal flora of the gut with the use of antibiotics^Q.

- Clindamycin^Q was the first antimicrobial agent associated with *C. difficile* colitis, almost any antibiotic may cause this disease.
- Toxins produced: Toxin A (an enterotoxin) and toxin B (a cytotoxin)^Q.

- Immunosuppression, medical comorbidities, prolonged hospitalization or nursing home residence, and bowel surgery increase the risk^Q.

Clinical Features

- The spectrum of disease ranges from watery diarrhea to fulminant, life-threatening colitis

Diagnosis

- Diagnosis is made after detection of one or both toxins by:
 - Stool cytotoxin assay^Q
 - ELISA^Q
- Colonoscopy: Characteristic ulcers, plaques, and pseudomembranes^Q

Treatment

- Immediate cessation of the offending antimicrobial agent^Q.
- Mild disease:
 - Oral metronidazole (10-day course): Drug of choice^Q
 - Oral vancomycin: Second-line agent, used in metronidazole allergy or in recurrent disease^Q
- Severe disease: Bowel rest, IV hydration, and IV metronidazole or oral vancomycin^Q.

- Recurrent colitis occurs in up to 20% of patients and may be treated by a longer course of oral metronidazole or vancomycin (up to 1 month).
- Fulminant colitis, characterized by septicemia and/or evidence of perforation, requires emergent laparotomy^Q.

140. Ans. c. Metronidazole

141. Ans. c. Antibiotic associated diarrhea

COLONIC RESECTION AND ANASTOMOSIS

142. Ans. b. Start IVF, c. Do urgent laparotomy (Ref: CSDT 11/e p24)

WOUND DEHISCENCE (BURST ABDOMEN)

- Serous or serosanguinous discharge from the wound is the first sign^Q of dehiscence

- Most commonly observed between 5th and 8th post-operative day^Q (may occur at any time following wound closure)

- Wound dehiscence is partial or total disruption of any or all layers of the operative wound.
- Extrusion of abdominal viscera after rupture of all layers is known as evisceration^Q.

Predisposing Factors for Wound Dehiscence	
Local Risk Factors	Systemic Risk Factors
<ul style="list-style-type: none"> • Inadequate closure (Most important)^Q • Increased intra-abdominal pressure • Deficient wound healing due to: <ul style="list-style-type: none"> - Infections^Q - Seroma^Q - Hematoma^Q - Presence of drain^Q 	<ul style="list-style-type: none"> • Old age^Q • Obesity^Q • Immunosuppression^Q • Systemic diseases: <ul style="list-style-type: none"> - Diabetes^Q - Uremia^Q - Jaundice, Sepsis^Q - Cancer^Q

Management

- Wound dehiscence without evisceration: Prompt elective closure^Q of the wound
- Wound dehiscence with evisceration:
 - Wound is covered with moist towels
 - Under GA, any exposed bowel or omentum is rinsed with RL containing antibiotics and then returned to abdomen
 - Previous sutures are removed, wound is reclosed (Tension suturing^Q)

143. Ans. b. IV fluids, e. Urgent surgery

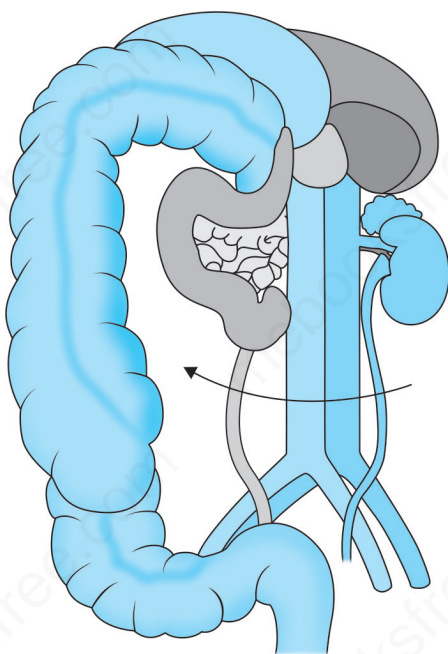
144. Ans. b. 5-10 days

145. Ans. d. Ischemia

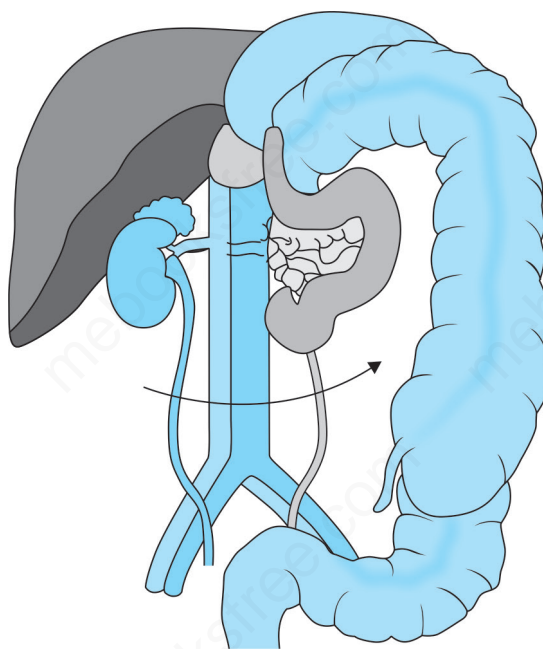
146. Ans. d. Cecum and ascending colon (Ref: Sabiston 19/e p1796-1797)

Maneuvers for Retroperitoneal Exposure

Kocher's Maneuver	Extended Kocher's Maneuver	Mattox Maneuver	Cattel-Braasch Maneuver
<ul style="list-style-type: none"> Surgical maneuver to expose structures in the retroperitoneum^a behind the duodenum and pancreas^a Used for mobilization of duodenum^a 	<ul style="list-style-type: none"> Right sided medial visceral rotation^a Right colon and duodenum is reflected medially^a Exposes IVC, infrarenal aorta, right renal artery and iliac vessels^a Recommended for drainage of infra-mesocolic hematoma^a 	<ul style="list-style-type: none"> Left sided medial visceral rotation^a Left sided viscera (Left kidney, left colon, spleen and pancreas) are brought to midline^a Exposes entire length of abdominal aorta, celiac axis, proximal part of mesenteric arteries and proximal left renal artery^a Recommended for drainage of central supra-mesocolic hematoma^a 	<ul style="list-style-type: none"> For extensive retroperitoneal exposure^a Right colon is fully mobilized and reflected medially^a Good option for exposure of the infrapancreatic segment^a



Left medial visceral rotation to expose the abdominal-aorta



Right medial visceral rotation to expose the infrahepatic vena cava

147. Ans. b. Right hemicolectomy

ENTERIC FISTULA

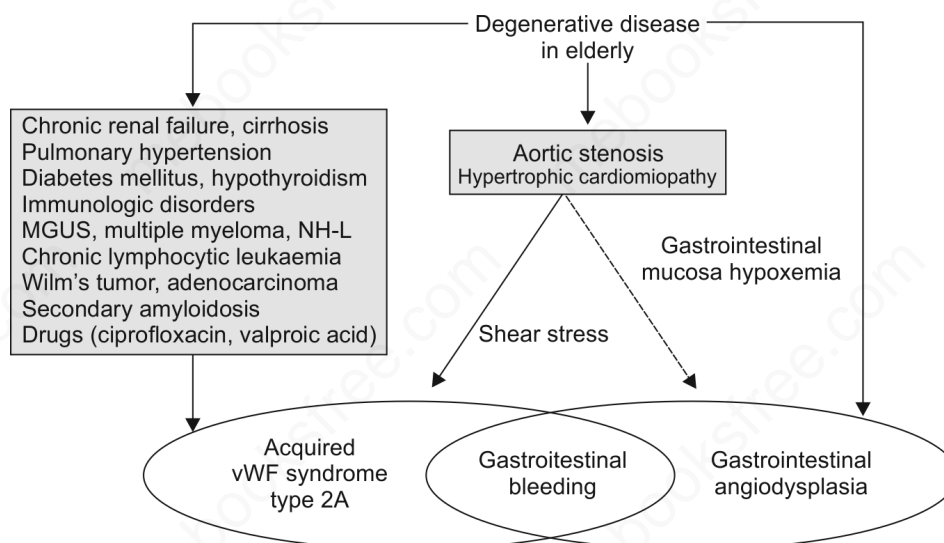
148. Ans. a. High output fistula drains 500 ml/day, c. Fluid and electrolyte loss can occur

149. Ans. a. Crohn's disease

LOWER GI BLEED

150. Ans. d. Dilated mucosal and submucosal veins in the colon (Ref: Harrison 18/e p972; Bailey 26/e 1174, 25/e p1157)

Diagnosis in a 65-year-old patient of bleeding per rectum with syncope and negative fecal occult blood test and no history of recent weight loss is Heyde's syndrome. The colonoscopic finding in Heyde's syndrome is dilated mucosal and submucosal veins in the colon.



HEYDE'S SYNDROME

- Heyde's syndrome is a triad of aortic stenosis, an acquired coagulopathy and anemia due to bleeding from intestinal angiodysplasia^Q.
- It is due to the induction of von-Willebrand disease type IIA by the valvular stenosis^Q.

Clinical Features:

- Gastrointestinal hemorrhage may present as **hematemesis, melena, or hematochezia**.
- It is not necessary for the aortic stenosis to lead to any other symptoms, but evidence of heart failure, syncope, or chest pain may be present if the stenosis is severe.

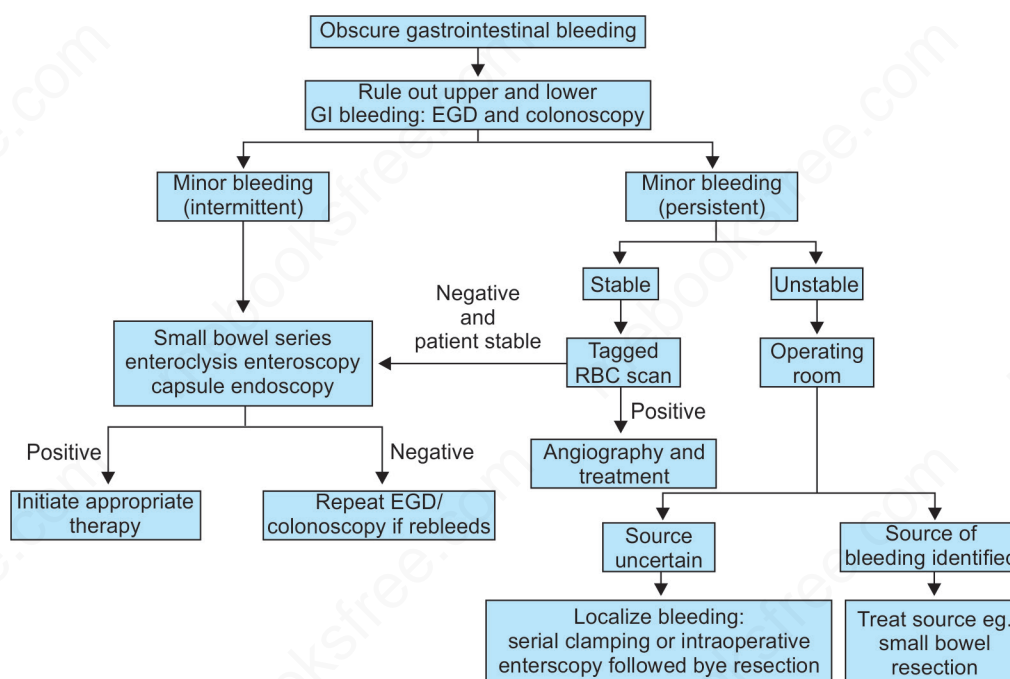
Diagnosis:

- Endoscopy or colonoscopy shows angiodysplasia^Q (Dilated mucosal and submucosal veins).

151. Ans. c. Aortic stenosis, gastrointestinal bleeding and angiodysplasia of colon (Ref: Harrison 18/e p972; Bailey 26/e p1174, 25/e p1157)

152. Ans. b. Colonoscopy (Ref: Sabiston 19/e p1173)

- Colonoscopy is the mainstay of diagnosis because it allows both visualization of the pathology and therapeutic intervention in colonic, rectal, and distal ileal sources of bleeding^Q.



153. Ans. b. Colonic diverticulosis (Ref: Sabiston 19/e p1173)

Lower Gastrointestinal Bleeding		
Colonic Bleeding (95%)	%	Small Bowel Bleeding (5%)
Diverticular disease ^Q	30-40	Angiodysplasias
Anorectal disease ^Q	5-15	Erosions or ulcers (potassium, NSAIDs)
Ischemia	5-10	Crohn's disease
Neoplasia	5-10	Radiation
Infectious colitis	3-8	Meckel's diverticulum
Postpolypectomy	3-7	Neoplasia
Inflammatory bowel disease	3-4	Aortoenteric fistula
Angiodysplasia	3	
Radiation colitis/proctitis	1-3	
Other	1-5	
Unknown	10-25	

154. Ans. a. Associated with cutaneous lesions (Ref: Sabiston 19/e p1175; Shackelford 7/e p1856-1863; Bailey 26/e p1174, 25/e p1156-1157)

VASCULAR ECTASIA (ANGIODYSPLASIA)

- MC vascular lesions found in the colon: Vascular ectasia^Q
- MC cause of recurrent lower intestinal bleeding after 60 years of age: Vascular ectasia^Q
- Arise from age-related degeneration of previously normal colonic blood vessels^Q.
- Acquired condition^Q
 - Almost always occur in the cecum or the proximal ascending colon^Q
 - Usually multiple, are <5 mm^Q in diameter
 - Rarely identified with gross inspection or routine pathologic examination
 - Diagnosed with colonoscopy or angiography
 - Angiography: Slow emptying of vein^Q and dilation of submucosal vessels^Q
- Not associated with synchronous angiomatous lesions of the skin, mucous membranes, or other viscera^Q.

155. Ans. b. Involvement of rectum in 50% of cases

156. Ans. d. Hemorrhoids (Ref: API Medicine 6/e p509, 511)

- API: "Hemorrhoids and anal fissure are the most common cause of lower GI bleeding, however the bleeding is rarely massive^Q."

157. Ans. a. Meckel's diverticulum, b. Rectal polyp

158. Ans. b. Intravenous metronidazole (Ref: Harrison 18/e p1686; Bailey 26/e p1157, 25/e p1173)

AMEBIC COLITIS

- MC site of amebic colitis: Cecum and ascending colon^Q
- Flask shaped ulcers on colonoscopy confirms the diagnosis of amebic colitis^Q

DRUG THERAPY FOR AMEBIASIS

- Asymptomatic carrier: Luminal agents (Iodoquinol, paromomycin)^Q
- Acute colitis: Metronidazole and luminal agents^Q
- Amebic liver abscess: Metronidazole, tinidazole and luminal agents^Q

159. Ans. b. Involvement of rectum in 50% cases

161. Ans. a. Diverticulosis

160. Ans. b. Colonoscopy

162. Ans. a. Sigmoid diverticula

LOWER GASTROINTESTINAL BLEED

- Lower gastrointestinal bleed is defined as a **bleeding** from a site **distal** to the **ligament of Treitz**^Q.

- MC site of lower GI bleed: **colon (95%)**^Q
- MC cause of lower GI bleed in India: **Hemorrhoids**^Q (Rarely massive bleeding)

- MC cause of significant lower GI bleed: **Diverticular disease (overall)**^Q
- MC cause of significant small bowel bleed: **angiodysplasia**^Q
- MC cause of recurrent, obscure lower GI bleed: **Vascular ectasia**^Q (angiodysplasia)

163. Ans. c. Ascending colon

164. Ans. None > b. Carcinoma

165. Ans. d. Diverticulum of sigmoid colon

166. Ans. a. Diverticulosis

167. Ans. c. For occult blood in stool (Ref: Harrison 18/e p662, 671)

FECAL OCCULT BLOOD TESTS

- Based on the property of an organic compound, **guaiac**, to **turn blue** after **oxidation** by **oxidants**, **peroxidases**, or the **pseudoperoxidase** of hemoglobin in the presence of an oxygen donor such as hydrogen peroxide.
- **Guaiac tests** are **more sensitive** for detecting **bleeding from the lower** than from the upper GI tract because hemoglobin (and its pseudoperoxidase activity) is degraded as it moves down the GI tract.
- **Fecal hemoglobin levels** must **exceed 10 mg/g (blood loss of 10 ml daily)**^Q for 50% of Hemoccult II tests to be positive.

BOWEL PREPARATION

168. Ans. a. Carcinoma colon (Ref: Sabiston 19/e p1308-1309; Schwartz 10/e p1194-1195, 9/e p1033; Shackelford 7/e p2308-2310)

BOWEL PREPARATION

- Normal microbial organisms in the **colon** compose up to 90% of the **dry weight of feces**, reaching concentrations up to **10⁹ organism/ml** of feces^Q.

- **Bacteroides**: MC colonic microbe^Q (anaerobe)
- **Escherichia coli**: MC aerobic colonic microbe^Q

- Colon is generally **cleansed** in preparation for **colonic operations** and adequate **colonoscopy** or **contrast enema**.

Bowel Preparation Consists of

1. **Special diet**: **Two days prior** to surgery, patient is put on **clear fluids**
2. **Purging** the fecal contents (**mechanical preparation**) by using cathartic, night before surgery
3. **Antibiotics** effective against colonic bacteria

- Complete bowel obstruction and **free perforation** are **absolute contraindications** to bowel preparation^Q.

Agents Used for Purging

- **Polyethylene glycol solution (PEG)**^Q
- **Sodium phosphate solution**^Q

- Sodium phosphate has been linked to rare, but serious, **electrolyte imbalances** in patients with **impaired renal function**^Q.
- PEG is the **recommended bowel preparation** in patients with renal **insufficiency**, **cirrhosis**, **ascites**, or **congestive heart failure**^Q.

- **Benefit from routine single-dose administration of parenteral antibiotics 30 minutes before incision**^Q is well established.

- Antibiotics active against both aerobes and anaerobes are ideal:
 - Second- or third-generation cephalosporins^Q
 - Fluoroquinolone + metronidazole^Q
 - Clindamycin^Q

- A preparation often used consists of **erythromycin base (1g)** and **neomycin (1g)** given in **three preoperative doses** the day before surgery^Q.

169. Ans. a. Colonic carcinoma

170. Ans. b. Polymyxin

LARGE INTESTINE ANATOMY AND PHYSIOLOGY

171. Ans. a. Node draining colon (Ref: BDC 4/vol II/254; Grays 40/e p1077)

LYMPHATIC DRAINAGE OF LARGE INTESTINE

- Lymphatic drainage also follows the arterial anatomy.
- Lymphatics from the colon and proximal two thirds of the rectum ultimately drain into the para-aortic nodal chain, which empties into the cisterna chyli^Q.

LYMPHATIC DRAINAGE OF LARGE INTESTINE

- Superior and inferior mesenteric nodes are part of Pre-aortic group of lymph nodes^Q.
- Lymphatics draining the distal rectum and anal canal may drain either to the para-aortic nodes or laterally, through the internal iliac system, to the superficial inguinal nodal basin (dentate line roughly marks the level where lymphatic drainage diverges)
- Lymph nodes are commonly grouped into levels depending on their location.

Epicolic	Located along the bowel wall and in the epiploicae ^Q
Paracolic	Located adjacent to the marginal artery ^Q
Intermediate	Located along the main branches ^Q of the large blood vessels
Primary or terminal	Located on the superior or inferior mesenteric artery ^Q

172. Ans. b. Colon 10^{10} - 10^{11} organisms (Ref: Jawetz Microbiology 23rd/1154; Sabiston 19/e p1303; Schwartz 9/e p1019)**NORMAL MICROBIAL FLORA OF INTESTINAL TRACT**

- At birth, the intestine is sterile, but organisms are soon introduced with food.
- In the breastfed children, the organisms present in the intestine: Lactic acid streptococci and Lactobacilli^Q
- In normal adults, the stomach acidity keeps the number of microorganism at minimum, unless obstruction at the pylorus favors the proliferation of gram positive cocci and bacilli.
- As the pH of intestinal contents becomes alkaline, the resident flora gradually increases^Q.
- In diarrhea, bacterial count decreases, whereas count increases in intestinal obstruction^Q.

Part of GIT	No. of Microorganisms
Stomach	10^2 - 10^5 /gm of contents
Duodenum	10^3 - 10^6 /gm of contents
Jejunum and Ileum	10^5 - 10^8 /gm of contents
Cecum and Transverse colon	10^8 - 10^{11} /gm of contents
Sigmoid and Rectum	10^{11} /gm of contents ^Q

173. Ans. c. Proximal colon (Ref: Sabiston 19/e p1307)

MOTILITY PATTERN OF COLON

- Right colon is the fermentation chamber of the human GI tract^Q
- Bacteria are most metabolically active in cecum^Q
- Left colon is a site of storage and dehydration of stool^Q.

Site	Motility Pattern
Right colon	• Antiperistaltic, or retropulsive waves ^Q generate retrograde flow of colonic contents back to the cecum.
Left colon	• Antegrade tonic contractions ^Q

- Mass peristalsis is interspersed with the propulsive and retropulsive contractions and occurs at varying intervals, more frequently after meals^Q.
- Mass peristaltic contraction advances a column of colonic contents through one third of the colonic length^Q.
- Increased postprandial contractility is greater in the sigmoid^Q than in the transverse colon.
- Gastrocolic reflex: Effects of a meal on colonic motility^Q

174. Ans. d. Destruction of auerbach plexus (Ref: Ganong 22/e p479)

Auerbach Plexus	Meissner's Plexus
<ul style="list-style-type: none"> Situated between and innervates outer longitudinal and inner circular layers^Q Primarily concerned with peristalsis^Q 	<ul style="list-style-type: none"> Situated between middle circular layer and mucosa^Q Also known as submucosal plexus^Q Primarily concerned with intestinal secretion^Q

175. Ans. c. Preaortic

176. Ans. b. Lignin (Ref: Sabiston 19/e p1304-1305)

FERMENTATION IN COLON

- Both microbiota and host obtain clear benefits from this association.
- Bacteria supply** the host with **butyrate**^Q (**main fuel** for **colonic epithelial cells**)
- Bacterial fermentation products are absorbed and used as a source of energy.
- Main sources of energy** for **intestinal bacteria** are **complex carbohydrates: starches** and **nonstarch polysaccharides (NSPs)**, also known as **dietary fiber**^Q.

- Lignin** is **not fermented** by **human colonic flora** and **attracts water**^Q, thus producing bulk.
- Celluloses** are **only partially fermented**^Q.
- Fruit pectins** are **completely fermented**^Q.

- Highly fermentable NSPs provide **minimal bulk** and **slow transit time**^Q.
- Constipation, diverticulosis, and colon cancer are **uncommon** in populations with a **high intake of roughage** (i.e., **water-insoluble NSPs**)^Q.

Water-insoluble fibers (Lignin)	• Used for the treatment of constipation ^Q
Water-soluble NSPs (Pectin)	• Used to treat diarrhea ^Q

MISCELLANEOUS

177. Ans. c. Proximal colostomy and bringing out the distal end as mucus fistula (Ref: Sabiston 19/e p465-466)

COLONIC INJURIES

- Colon injuries** are generally the **result of penetrating trauma**^Q.
- The incidence of **infectious complications** after a **colonic injury** is related to **inadequate treatment** or **delay in diagnosis**^Q.

Diagnosis

- Physical examination** is particularly useful to **establish that laparotomy is necessary** after a stab wound to the abdomen if **peritoneal signs** are present^Q

- A **negative physical examination** does **not rule out** the presence of a **colonic injury**, particularly in **patients with stab wounds** to the **back and flanks**^Q.

- An **objective evaluation** of the abdomen is **warranted after stab wounds** and may include **DPL** or a **triple-contrast (oral, IV, and rectal) CT scan**^Q.

- Gunshot wounds** to the abdomen usually **indicate the necessity for laparotomy**, and with few exceptions, **no further workup is necessary**^Q and the colonic injury will be diagnosed during abdominal exploration.

- Presence of blood** on **rectal examination** is **strong evidence** of **colon or rectal injury**^Q.

Treatment

- Primary repair** can be selected **when known associated complicating factors** have been **excluded**^Q.

Indications of Primary Repair

- Early diagnosis** (within **4-6 hours**)^Q
- Absence of prolonged shock** or **hypotension**^Q
- Absence of gross contamination**^Q of the peritoneal cavity
- Absence of associated colonic vascular injury**^Q
- Less than 6 units** of **blood transfused**^Q
- No requirement** for the use of **mesh**^Q to permanently close the abdominal wall

- Low-risk penetrating colonic injuries:** **Primary closure** or **resection and primary anastomosis**^Q
- High-risk colon injuries** or those associated with **severe injuries:** **Resection and colostomy**^Q.

Complications

- Abscess formation, anastomotic leak and peristomal hernia

178. Ans. d. Bleeding PR

179. Ans. c. Most commonly subserosal (Ref: Maingot 11/e p838)

COLONIC LIPOMA

- Ninety percent of colonic lipomas are localized to the submucosa^Q
- Rarely found in other layers of the bowel wall
- Develop in the 5th or 6th decade of life
- More common in the large intestine^Q.
- Solitary lipomas tend to occur more frequently on the right side^Q of the colon in the vicinity of the ileocecal valve or the ascending colon

Clinical Features

- Generally asymptomatic^Q but may be found incidentally on colonoscopy.
- Big lipomas may cause symptoms such as gastrointestinal bleeding, diarrhea, intussusception, or bowel obstruction^Q.

Diagnosis

- Pathognomonic sign of a colonic lipoma: Squeeze sign^Q
- Endoscopic signs: Cushion sign, Tenting sign, naked fat sign^Q

Treatment

- Endoscopic removal of a lipoma

IMPORTANT TOPICS**SHORT CHAIN FATTY ACIDS (SCFA)**

- Short chain fatty acids are produced in the colon and absorbed from it^Q.
- SCFAs: Acetate (60%), Propionate (25%), Butyrate^Q (15%)
- Formed by action of colonic bacteria on complex carbohydrates, resistant starches, and other component of dietary fibers.

ANATOMY OF COLON

- The meandering artery or Arc of Riolo^Q is a collateral branch that connects the proximal MCA to the LCA and runs in the transverse mesocolon parallel to the left branch of the MCA.
- Griffith's point^Q: splenic flexure, where the vascular arcades connecting the MCA and LCA are often absent
- Sudek's point^Q: inconsistent marginal artery at the junction of the lowest sigmoid branch and the superior hemorrhoidal artery

- Jackson Membrane^Q: Adhesion from the right abdominal wall to the anterior taenia of the ascending colon.
- Gerlach valves^Q: A mucosal fold covering the appendiceal orifice.
- Fold of Treves^Q: Inferior ileocecal fold (does not contain any vessel, referred as the bloodless fold of Treves)

- Fold of Treves is the only antimesenteric epiploic appendage normally found on the small intestine and marks the junction of the ileum and cecum^Q

- Widest portion of colon: Cecum^Q
- Narrowest portion of colon: Sigmoid^Q
- MC site of colonic rupture caused by distal obstruction: Cecum^Q
- Colon absorbs water, NaCl^Q; secretes K⁺, HCO₃⁻ and mucus^Q
- MC site of ischemic colitis: Splenic flexure

LARGE INTESTINE

- Length of cecum: 7.5 cm (x=7.5 cm)
- Length of Transverse colon: 45 cm (6x)
- Length of Sigmoid colon: 30 cm (4x)
- Length of Ascending colon: 15 cm (2x)
- Length of Descending colon: 22.5 cm (3x)

Ileostomy and Colostomy

MULTIPLE CHOICE QUESTIONS

ILEOSTOMY AND COLOSTOMY

1. Most common complication of end colostomy:

(JIPMER 2011)

- a. Parastomal hernia
- b. Prolapse
- c. Perforation
- d. Bleeding

2. Known complication of stoma (e.g., Colostomy stoma):

(MHPGMCET 2009)

- a. Prolapse
- b. Stenosis
- c. Retraction
- d. All of the above

3. Continent ileostomy is done in all the following except:

(MHSSMCET 2005)

- a. Ulcerative colitis with poor anal tone
- b. Crohn's disease
- c. Redo Hirschsprung's disease
- d. All

4. Mercedes procedure is used in:

(MHSSMCET 2008)

- a. Discrepancy in size of ileum and stoma
- b. Ileostomy stenosis
- c. Ileostomy prolapse
- d. Ileostomy leak

5. Early postoperative complication of ileostomy:

(AIIMS Nov 2006)

- a. Obstruction
- b. Prolapse
- c. Diarrhea
- d. Necrosis

6. Guyrope's technique is related to:

(MHSSMCET 2009)

- a. Ileal resection and anastomosis
- b. Ileostomy
- c. Colostomy
- d. All of the above

7. Which of the following is not a recognized complication of colostomy?

(MHSSMCET 2011)

- a. Prolapse
- b. Necrosis
- c. Stenosis
- d. Constipation

8. Early postoperative complication of ileostomy:

(JIPMER 2014, AIIMS May 2012)

- a. Obstruction
- b. Prolapse
- c. Diarrhea
- d. Necrosis

9. The following regarding colostomy are true except:

(Kerala 2000)

- a. A colostomy is an artificial opening made in large bowel to divert the faeces to the exterior
- b. Temporary colostomy is established to defunction and anastomosis
- c. Permanent colostomy is formed after the resection of rectum by the abdominoperineal technique
- d. Double barreled colostomy is commonly done now a days
- e. Colostomy hernia is common complication

10. Parastomal hernia is most frequently seen with:

(All India 2009)

- a. End colostomy
- b. Loop colostomy
- c. End ileostomy
- d. Loop ileostomy

11. Early complications of ileostomy are all except:

(GB Pant 2011)

- a. High output
- b. Ischemic necrosis
- c. Retraction
- d. Stenosis

EXPLANATIONS

ILEOSTOMY AND COLOSTOMY

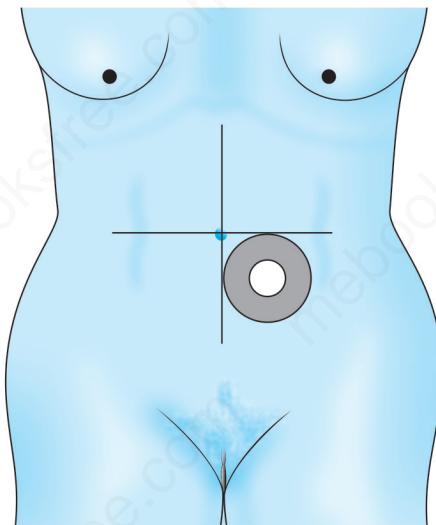
1. **Ans. a. Parastomal hernia** (Ref: Sabiston 19/e p1362-1365; Schwartz 10/e p1192-1193, 9/e p1029-1032; Bailey 26/e p1175-1176, 25/e p1185-1187; Shackelford 7/e p2248-2260; Maingot 11/e p141-148)

- MC complication of both end and loop colostomy: Parastomal hernia^Q
- Complications (both parastomal hernia and prolapse) are more common in loop colostomy^Q as compared to end colostomy.
- MC complication of ileostomy: Skin irritation^Q
- MC early complication of ileostomy: Ischemic necrosis^Q

STOMA FORMATION

- A colostomy is a connection of the colon to the skin of the abdominal wall.
- An ileostomy involves exteriorization of the ileum on the abdominal skin.
- MC indications of stoma formation: Colorectal cancer, chronic ulcerative colitis and Crohn's disease^Q
- Ileostomy revisions are most commonly performed for Crohn's disease^Q.

- Appearance of a fistula adjacent to a stoma usually indicates recurrence of Crohn's disease^Q.
- A special complication in portal hypertension: Varices can form in the peristomal skin^Q.



COLOSTOMY

- MC indication for fashioning a colostomy: CA rectum^Q
- Colostomies are also constructed as treatment for obstructing lesions of the distal large intestine and for actual or potential perforations^Q.

Type by Anatomic Location

- | | |
|--|---|
| <ul style="list-style-type: none"> • End-sigmoid colostomy (MC)^Q • End-descending colostomy^Q | <ul style="list-style-type: none"> • Transverse colostomy • Cecostomy |
|--|---|

- However, if the IMA is transected during an operation for CA rectum, the blood supply to the sigmoid colon is no longer dependable, and it should not be used for stoma construction. Therefore, an "end-descending" colostomy is usually preferable to an end-sigmoid colostomy^Q.

- Location of the colostomy should avoid any deep folds of fat, scars, and bony prominences of the abdominal wall^Q.

Type by Function

- | |
|--|
| <ul style="list-style-type: none"> • To provide decompression of the large intestine^Q • To provide diversion of the feces^Q |
|--|

Decompressing Colostomy	Diverting Colostomy
Indications <ul style="list-style-type: none"> • Distal obstructing lesions causing massive dilation of the proximal colon without ischemic necrosis^a • Severe sigmoid diverticulitis with phlegmon^a • Selected patients with toxic megacolon^a 	Indications <ul style="list-style-type: none"> • When distal segment of bowel has been completely resected (as during APR)^a • Known or suspected perforation or obstruction of the distal bowel (e.g., obstructing carcinoma, diverticulitis, leaking anastomosis, or trauma^a) • Destruction or infection of the distal colon, rectum, or anus (e.g., Crohn's disease or failed anal sphincter reconstruction)^a
Types of Decompressing Stomas <ul style="list-style-type: none"> • Blow-hole cecostomy • Blow hole transverse colostomy • Tube type of cecostomy • Loop-transverse colostomy 	Types of Diverting Stomas <ul style="list-style-type: none"> • Loop-transverse colostomy • Loop sigmoid colostomy

2. Ans. d. All of the above (Ref: Sabiston 19/e p312-313, 1362-1365; Schwartz 10/e p1192-1193, 9/e p1032; Bailey 26/e p1175-1176, 25/e p1187; Shackelford 7/e p2256-2260; Maingot 11/e p153-154)

STOMAL COMPLICATIONS

- Stomas are widely used in the treatment of colorectal, intestinal, and urologic diseases.
 - An intestinal stoma can be an ileostomy, colostomy, or urostomy, end, loop, or end-loop, temporary or permanent, diverting or decompressing, or continent or incontinent.
- A tube cecostomy and a blowhole are considered temporary decompressing colostomies performed in emergencies^a.
- Technical factors are most important in minimizing the complication rate of stoma construction and are largely preventable.
 - Early complications are considered those that occur within 30 days^a after surgery.

Clinical Presentation and Diagnosis	
Ischemic necrosis ^a	• From impaired perfusion to the terminal portion of the bowel as a result of a tight aperture, overzealous trimming of mesentery, or mesenteric tension.
Stomal retraction ^a	• Occurs early as a result of tension on the bowel or ischemic necrosis of the stoma.
Late retraction ^a	• Caused by increased thickness of the abdominal wall with weight gain.
Stenosis ^a	• As a result of a small aperture (natural maturation), ischemia, recurrence of Crohn's disease, or development of carcinoma.
Mucocutaneous separation	• As a result of ischemia, inadequate approximation of mucosa to the dermal layer of skin, excessive bowel tension, or peristomal infection.
Stomal prolapse ^a	• Most alarming to the patient and can result in incomplete diversion of stool, interfere with the stoma appliance, lead to leakage of stool, or become associated with obstructive symptoms and incarceration.
Parastomal hernia ^a	• Occurs to some degree in most patients.
Peristomal fistula	• Sign of Crohn's disease, may result from a deep suture used to mature the stoma, or may be caused by trauma from an appliance.
Chemical dermatitis ^a	<ul style="list-style-type: none"> • Caused by contact of the stoma effluent with peristomal skin^a • Manifested as erythema, ulceration (ileostomy effluent), encrustation (urostomy effluent), or pseudoepitheliomatous hyperplasia.
Traumatic dermatitis	<ul style="list-style-type: none"> • Occurs during change of the stomal device, from stripping of adhesive, or as a result of friction or pressure from the stomal device or supportive belt. • Manifested as erythema, erosion and ulceration.
Diarrhea and dehydration ^a	• Commonly occurs in older patients, in hot weather, during strenuous exercise, and in association with short bowel syndrome.
Cutaneous manifestations of the disease ^a	<ul style="list-style-type: none"> • Damaged peristomal skin in psoriasis^a • Pyoderma gangrenosa in IBD^a • Parastomal varices in portal hypertension^a

3. **Ans. b. Crohn's disease** (Ref: Sabiston 19/e p312-313, 1362-1365; Schwartz 10/e p1192-1193, 9/e p1029-1032; Bailey 26/e p1174-1176, 25/e p1185-1187; Shackelford 7/e p2249-2255; Maingot 11/e p154-166)

ILEOSTOMY

- Opening constructed between the small intestine and the abdominal wall, usually by using distal ileum.
- **Indications of Permanent ileostomy:** For patients who require removal of the entire colon and rectum (Crohn's disease or ulcerative colitis^Q)
 - **Indications of loop ileostomy:** Cases where multiple and complex anastomoses must be performed distally (Crohn's disease or CA rectum^Q).
- **Loop ileostomy use** is becoming more frequent (because of the complex sphincter-preserving operations being performed for UC and FAP)

Types of ileostomies

<ul style="list-style-type: none"> • End ileostomy (Brooke) • Loop ileostomy • Loop-end ileostomy 	<ul style="list-style-type: none"> • Continent ileostomy (Kock pouch) • Urinary conduit
--	---

Continent Ileostomy

- Continent ileostomy, or **Kock pouch**, has been used as an alternative to a conventional ileostomy for selected patients with UC or FAP^Q.
- **Contraindicated in Crohn's disease^Q** (risk of recurrent disease)
 - **Not recommended for well-functioning end ileostomy^Q.**
- It involves construction of an **internal pouch with a continent nipple valve**.
 - The **complication rate** for construction of this **continent ileostomy** has been **high** because of the difficulty in maintaining continence of the nipple valve and position of the pouch so that intubation can be easily accomplished.

Continent Ileostomy

Advantages	Disadvantages
<ul style="list-style-type: none"> • Patient need not wear an appliance^Q • Patient is continent between intubations^Q • Better quality of life^Q 	<ul style="list-style-type: none"> • Not all patients are continent • Require multiple intubations during the day • Difficulty in intubation • Prolonged surgery with substantial risk of complications.

4. **Ans. a.** Discrepancy is size of ileum and stoma

Mercedes Procedure^Q	Used when there is discrepancy between the size of the ileal loop and the ileostomy stoma .
Mercedes benz or seagull sign^Q	Rarely the centre of gallstone may contain radioluscent gas in a triradiate or biradiate fissure . This gives characteristic dark shapes on radiograph
Mercedes sign incision^Q	Excision of xiphoid process and downward traction on the liver provides excellent exposure of the hepatic veins and suprahepatic IVC

5. **Ans. d. Necrosis** (Ref: Sabiston 19/e p312-313; Schwartz 10/e p1193, 9/e p1031; Bailey 26/e p1176, 25/e p1187; Shackelford 7/e p2256-2260; Maingot 11/e p164-165)

- Schwartz says "**Stoma necrosis** may occur in the **early post-operative period** and usually is caused by **skeletonizing the distal small bowel** and/e por **creating an overly tight fascial defect**. (AIIMS May 2012)

Stomal Complications

	Early (RAPID) (RAPID-0)		Late (SPF-G0)	
Stoma	<ul style="list-style-type: none"> • Poor location • Retraction* • Ischemic necrosis^Q 	<ul style="list-style-type: none"> • Detachment • Abscess formation • Opening wrong end 	<ul style="list-style-type: none"> • Prolapse^Q • Stenosis^Q • Parastomal hernia^Q 	<ul style="list-style-type: none"> • Fistula formation^Q • Gas • Odor
Peristomal skin	<ul style="list-style-type: none"> • Excoriation^Q • Dermatitis* 		<ul style="list-style-type: none"> • Parastomal varices • Dermatoses 	<ul style="list-style-type: none"> • Cancer • Skin manifestations of IBD
Systemic	<ul style="list-style-type: none"> • High output* 		<ul style="list-style-type: none"> • Bowel obstruction^Q • Nonclosure 	

- *May also develop as a late complication

TREATMENT OF STOMAL COMPLICATIONS

- To prevent most stomal complications, **adherence to sound surgical technique** is imperative.
- In emergencies and difficult cases such as the **obese, distended bowel**, and **shortened mesentery**, to ensure delivery of a viable stoma free of tension, the **fascial aperture** may be **made larger**^Q.
- **Viability of the stoma** is checked with a **test tube** and a **flashlight** or **endoscopy**^Q.
 - **Necrosis extending to and beyond the fascia** requires **immediate reoperation**^Q.
 - **Ischemia limited to a few millimeters** is **observed** and may not result in any long-term sequelae.
 - **Repair of stomal retraction** often requires **laparotomy**^Q.
- **Skin-level stenosis** can be **repaired locally** and **stenoses from other causes** can be **repaired via laparotomy**.
- **Complete separation or detachment** usually requires **revision**.
- **Repair of end stomal prolapse** can be **achieved locally** by making a **circumferential incision** at the mucocutaneous junction, **excision of redundant bowel**, and **rematuration**.
 - **Repair of loop stomal prolapse** is achieved by **local revision to an end stoma**.
 - **Laparotomy** may be required for the treatment of **recurrent prolapse** and **prolapse associated with a parastomal hernia**.
 - **Large permanent or complicated parastomal hernias** are treated by **relocating the stoma** or **reinforcing the fascia ring with mesh** (synthetic or biomaterial).
- Treatment of a **peristomal fistula** entails **resection of the diseased or involved segment of bowel** and **relocation of the stoma**.
- Treatment of **mucosal islands** ranges from **ablation with electrocautery** to **relocation of the stoma**.
- Treatment of **chemical dermatitis** entails **cleaning the damaged skin**, the use of **barriers**, and a **properly fitting stomal management system**^Q.

6. Ans. b. Ileostomy (Ref: www.ncbi.nlm.nih.gov/pubmed/2658641)

- **Guy rope principle** is used to **evert the necessary length** of bowel in creation of ileostomy.

GUY ROPE PRINCIPLE

- In the creation of a **permanent ileostomy**, a **fully everted nipple** ensures a **good fit of the stomal appliance**.
- In normal bowel segment this may not pose a problem, but **forceful attempts at eversion** in **diseased, thickened, and friable bowel** may **result in damage to the bowel segment**.
- In order to prevent this, **guy rope principle** is used to **evert the necessary length** of bowel^Q.

7. Ans. d. Constipation

8. Ans. d. Necrosis

9. Ans. d. Double barreled colostomy is commonly done now a days (Ref: Bailey 26/e p1176, 25/e p1186)

- Bailey says “**Double-barrelled colostomy** was designed so that it **could be closed by crushing the intervening ‘spur’** using an **enterotome** or a **stapling device**. It is **rarely used now**, but occasionally the colon is divided so that both ends can be brought to the surface separately, ensuring that the distal segment is completely defunctioned.”

STOMAS

- May be **colostomy** or **ileostomy**
- May be **temporary** or **permanent**
- **Temporary or defunctioning stomas** are usually fashioned as **loop stomas**
- An **ileostomy** is **spouted**; a **colostomy** is **flush**^Q
- **Ileostomy effluent** is usually **liquid** whereas **colostomy effluent** is usually **solid**^Q
- **Ileostomy patients** are more likely to develop **fluid** and **electrolyte problems**
- An **ileostomy** is usually sited in the **right iliac fossa**^Q
- A **temporary colostomy** may be **transverse** and sited in the **right upper quadrant**^Q
- **End-colostomy** is usually sited in the **left iliac fossa**^Q
- All patients should be counseled by a stoma care nurse before operation

10. Ans. b. Loop colostomy

11. Ans. d. Stenosis

Inflammatory Bowel Disease

MULTIPLE CHOICE QUESTIONS

INFLAMMATORY BOWEL DISEASE

- Crohn's disease can be seen in:** (COMEDK 2007)
 - Jejunum only
 - Colon only
 - Terminal ileum and right side
 - Mouth to anus
- Cobble stone appearance is seen in:** (Kerala PG 2015, COMEDK 2008, 2007)
 - Ulcerative colitis
 - Crohn's disease
 - Appendicitis
 - Carcinoma rectum
- String sign of Kantor seen in:** (APPG 2008)
 - Crohn's disease
 - Ulcerative colitis
 - Both
 - None
- Which of the following statements about Crohn's disease is incorrect?** (DPG 2009 March)
 - Granuloma present frequently
 - It is separate and distinct form ulcerative colitis
 - Cigarette smoking is a risk factor
 - Rectum spared in 50% patients with large bowel involvement
- Which of the following is not associated with Crohn's disease?** (MCI March 2005)
 - Fistula
 - Stricture
 - Sclerosing cholangitis
 - Granuloma
- True statement regarding anorectal Crohn's disease:**
 - Ulceration, fistula is common
 - Fistulas are painless and indurated
 - Non-cutting setons are used in management
 - All of the above
- Ulcerative colitis starts from:** (GB Pant 2011)
 - Rectum
 - Sigmoid colon
 - Ascending colon
 - Any part
- Crohn's disease is best diagnosed by** (GB Pant 2011)
 - Upper GI series
 - Enteroclysis
 - Capsule endoscopy
 - CECT
- Characteristic of Crohn's disease:** (GB Pant 2011)
 - Transmural involvement with skip lesions
 - Large bowel involvement
 - Pseudopolyps
 - Involvement of mucosa only
- All are true about ulcerative colitis except:** (PGI SS June 2007)
 - Terminal ileum may be involved
 - Stricture formation is present
 - Malignancy after 10 years
 - Crypt abscess is pathognomonic
- Skip lesions are seen in:** (NEET Pattern, AIIMS May 2009)
 - Ulcerative colitis
 - Typhoid
 - Crohn's disease
 - Tuberculosis
- A patient gives chronic history of diarrhea and blood in stool presents with multiple fistulae in the perineum and multiple stricture in small intestine. The diagnosis is:** (AIIMS June 2000)
 - In Crohn's disease
 - Radiation enteritis
 - Ulcerative colitis
 - Ischemic bowel disease
- In Crohn's disease all are seen except:** (PGI Dec 2006)
 - Hyperplastic polyps
 - Diverticulosis
 - Fissuring ulcer
 - Epithelioid granuloma
 - Crypt abscess
- Crohn's disease is associated with following:** (DPG 96)
 - Stomach not involved
 - No granulomatous + Transmucosal fissures
 - Continuous involvement
 - Through and through involvement of thickness of bowel wall
- Transmural inflammation with skip lesions in colon are characteristic of:** (Comed-K, AIIMS Nov 94)
 - Regional ileitis (Crohn's disease)
 - Ischemic colitis
 - Ulcerative colitis
 - Nonspecific colitis
- Patient with recurrent diarrhea, pseudopolyp, lead pipe appearance on barium enema has:** (PGI June 2000)
 - Ulcerative colitis
 - Crohn's disease
 - Irritable bowel syndrome
 - Short bowel syndrome
- Skip lesions with tuberculoid granulomas is characteristic of:** (AIIMS 91)
 - Hodgkin's lymphoma
 - Sarcoidosis
 - Crohn's disease
 - Ulcerative colitis
- False regarding involvement in Crohn's disease:** (AIIMS 94)
 - Anorectal area
 - Rectum
 - Small intestine with right colon
 - Large alone without involvement of small intestine

19. **Ulcerative colitis starts in:** (DPG 95)
 a. Descending colon b. Transverse colon
 c. Caecum d. Rectum

20. **UC can be differentiated from Crohn's disease by all except:** (DNB 2005, AIIMS GIS May 2011)
 a. Pseudopolyps b. Rectal sparing
 c. Discontinuous lesions d. Deep longitudinal ulcers

21. **Ulcerative colitis involves:** (PGI Dec 2001)
 a. Serosa b. Lamina propria
 c. Mucosa d. Circularis muscle
 e. Submucosa

22. **Inflammatory bowel disease found in children:** (PGI June 2006)
 a. Ulcerative colitis
 b. Tropical sprue
 c. Crohn's disease
 d. Celiac disease
 e. Cystic fibrosis

23. **In a 27-years old male, most common cause of a colovesical fistula would be:** (All India 2001, 99)
 a. Crohn's disease b. Ulcerative colitis
 c. TB d. Cancer colon

24. **Ulcerative colitis almost always involves the:** (AIIMS 87)
 a. Caecum b. Sigmoid
 c. Right colon d. Rectum

25. **Which is true of ulcerative colitis?** (AIIMS 92)
 a. String sign of Kantor positive
 b. Skip lesions are seen
 c. Rectum is always involved
 d. Fistulas are common

26. **The commonest site of involvement in the Crohn's disease is:** (COMEDK 2005)
 a. Jejunum b. Transverse colon
 c. Terminal ileum d. Rectum

27. **The indications of colonoscopy in a patient with ulcerative colitis are all of the following except:** (COMEDK 2010)
 a. Diagnosis of the extent of inflammation
 b. Differentiating if from Crohn's disease
 c. Diagnosis of toxic megacolon
 d. Monitoring the response to treatment

28. **Crohn's disease is associated with:** (COMEDK 2011)
 a. NOD2/CARD-15 gene b. P53 suppressor gene
 c. Philadelphia chromosomes d. BRAC-1 gene

29. **Following statements regarding ulcerative colitis is true:** (COMEDK 2011)
 a. Smoking has a protecting effect
 b. Smoking does not have a protective effect
 c. There is no relation to smoking
 d. Smoking causes relapses

30. **Skip lesions are characteristic of** (NEET 2013, JIPMER 2010)
 a. Typhoid b. Ischemic bowel disease
 c. Ulcerative colitis d. Crohn's disease

31. **Which one is commonly associated with Crohn's disease?** (PGI Nov 2009)
 a. Cologastric b. Coloureteric
 c. Colovesical d. Coloduodenal
 e. Colovaginal

32. **All are true about Ulcerative colitis except:** (PGI Nov 2009)
 a. All layers are involved
 b. Malabsorption
 c. Backwash ileitis in 10–15%
 d. Mesalazine maintains the disease in remission
 e. Rarely recurs after surgery

33. **True about Ulcerative colitis:** (PGI Dec 2006)
 a. Involves colon only
 b. Transmural involvement

- c. Recurrent with watery diarrhea
 d. Crypt abscess
 e. Serosal involvement seen

34. **Which of the following is true about ulcerative colitis?** (DNB 2011, MHPGMCET 2005, 2002)

- a. Premalignant condition
 b. Cobblestone mucosa is characteristic
 c. Almost always leads to toxic megacolon
 d. Rarely affects rectum

35. **Pathognomonic of Crohn's disease** (MHSSMCET 2009)
 a. Transmural inflammation b. Stricture of small bowel
 c. Contiguous involvement d. Lead pipe colon

36. **Hose pipe appearance of intestine is a feature of:** (Recent Questions 2013)
 a. Crohn's disease
 b. Malabsorption syndrome
 c. Ulcerative colitis
 d. Hirschsprung's disease

IBD EXTRAINTESTINAL MANIFESTATIONS

37. **In ulcerative colitis, after colectomy least likely to resolve is:** (AIIMS GIS 2003)
 a. Ankylosing spondylitis b. PSC
 c. Pyoderma gangrenosum d. Erythema nodosum

38. **Non-correctable lesion after colectomy for UC:** (AIIMS GIS May 2008)
 a. Skin lesions b. Arthritis
 c. PSC d. Iritis

39. **Pyoderma-gangrenosum is most commonly associated with:** (All India 99)
 a. Ulcerative colitis b. Crohn's disease
 c. Amoebic colitis d. Ischemic colitis

40. **All are true associations of ulcerative colitis except:** (PGI Dec 99)
 a. Erythema nodosum b. Circinate balanitis
 c. Sclerosing cholangitis d. Aphthous stomatitis

41. **All of the following extraintestinal manifestations of ulcerative colitis respond to colectomy except:**
 a. Primary sclerosing cholangitis
 b. Pyoderma gangrenosum
 c. Episcleritis
 d. Peripheral arthralgia

42. **The following are complications of ulcerative colitis except:** (All India 90)
 a. Peptic ulceration b. Arthritis
 c. Sclerosing cholangitis d. Toxic megacolon

43. **Type of renal stone formed in a patient with regional enteritis:** (JIPMER 2011)
 a. Calcium oxalate b. Cysteine
 c. Struvite d. Urate

44. **Most common stones in ulcerative colitis:** (DPG 2007)
 a. Oxalate b. Cysteine
 c. Uric acid d. Phosphate

IBD TREATMENT

45. **Treatment of choice in case of chronic ulcerative colitis is:** (AIIMS June 95)
 a. Colectomy with ileostomy
 b. Colectomy + manual proctectomy + ileoanal pouch anastomosis
 c. Proctocolectomy with ileoanal anastomosis
 d. Ileorectal anastomosis

46. **Surgical treatment of Ulcerative colitis:** (PGI June 2005)
 a. Done in late cases only
 b. Done in cases where medical treatment fails
 c. Pouch surgery done
 d. Restorative proctocolectomy done in emergency cases
47. **Surgical indications in inflammatory bowel diseases are all except:** (PGI June 2006)
 a. Obstruction
 b. Perianal complication
 c. Extraintestinal complication
 d. Stricture
 e. Malignancy
48. **True statements about inflammatory bowel disease (IBD)**
 a. Surgery is the 1st management (PGI June 2003)
 b. Pouch operation is done for fulminant ulcerative colitis
 c. 2% case of Crohn's disease undergo malignant changes
 d. Ulcerative colitis don't undergo malignant changes
49. **Which sulphonamide is used for the treatment of ulcerative colitis?** (All India 88)
 a. Sulphamethiazole
 b. Sulphathalazole
 c. Sulphaguanidine
 d. Salazopyrin
50. **Sulfasalazine exerts its primary action in ulcerative colitis by inhibition of:** (COMEDK 2004)
 a. Folic acid synthesis
 b. Formation of prostaglandins (PG)
 c. Phospholipase C
 d. Formation of interleukins
51. **Procedure of choice in ulcerative colitis with acute perforation is:** (AIIMS 86, 88)
 a. Defunctioning ileostomy
 b. Closure of perforation
 c. Proximal diversion colostomy
 d. Total colectomy and ileostomy
52. **Sulfonamide useful in treating ulcerative colitis is:** (All India 91)
 a. Sulfadiazine
 b. Sulfasalazine
 c. Sulfamethoxazole
 d. Sulfadimidine
53. **Best treatment for remission of acute ulcerative colitis is:** (AIIMS 97)
 a. Sulphasalazine
 b. Prednisolone
 c. Aminosalicyclic acid
 d. NSAIDS
54. **Indication of emergency surgery in ulcerative colitis is/are:** (PGI Nov 2011)
 a. Toxic megacolon
 b. Massive colonic hemorrhage
 c. Extraintestinal manifestation
 d. Colonic perforation
 e. Colonic dysplasia
55. **After subtotal colectomy for toxic megacolon in CD, lowest recurrence is with:** (AIIMS GIS 2003)
 a. Complete proctectomy with Brooke ileostomy
 b. Ileorectal anastomosis
 c. Koch's pouch
 d. IPAA
56. **Treatment of choice in ulcerative colitis:** (GB Pant 2011)
 a. Total proctocolectomy with IPAA
 b. Total colectomy with IRA
 c. Total colectomy with ileostomy
 d. Total proctocolectomy with ileostomy
57. **Not an indication for surgery in ulcerative colitis:**
 a. Presence of dysplasia on colonic biopsy
 b. Pancolitis (PGI SS Dec 2009)
 c. Toxic megacolon
 d. Failure of response to medical therapy of acute colitis
58. **True statement regarding management of ileocaecal crohn's disease is:** (JIPMER, 2014, 2007)
 a. Avoid antibiotics
 b. Avoid steroids in first week
 c. 5-ASA reduces small bowel obstruction
 d. Cholestyramine improves diarrhea, worsens steatorrhea

COLITIS ASSOCIATED CARCINOMA

59. **Risk of carcinoma in ulcerative colitis:** (GB Pant 2011)
 a. 20% after 20 years
 b. 20% after 30 years
 c. 30% after 30 years
 d. 50% after 30 years
60. **Risk of malignancy in ulcerative colitis is more in:** (PGI Dec 2001)
 a. Onset in childhood
 b. Extensive involvement of colon
 c. Disrupted architecture with crypt abscesses
 d. Pseudopolyps
 e. Recurrence after treatment
61. **Not true about malignancy arising from ulcerative colitis is:** (PGI June 99)
 a. Takes at least 10 years to develop
 b. Left sided is more common
 c. Associated with dysplasia of the rest of the colon
 d. Younger age of onset is associated with increased chance of carcinoma
62. **In ulcerative colitis, carcinoma arises from:** (PGI Dec 98)
 a. Pseudopolyps
 b. Dysplastic sites
 c. Familial polyps
 d. Multiple adenomatous polyp
63. **Ulcerative colitis progressing to malignancy is characterized by following except:** (PGI 97)
 a. Risk increases with the time
 b. Prognosis worsens
 c. Prognosis depends on period
 d. Arise from pseudo polyps
64. **False about malignancy in ulcerative colitis:**
 a. Poorly differentiated with higher stage (AIIMS GIS 2003)
 b. Related to extent of disease
 c. Poor prognosis as compared to sporadic
 d. Evenly distributed
65. **All are true about colonic cancer in UC except:** (AIIMS GIS Dec 2010)
 a. In younger patients
 b. Depends upon duration of disease
 c. Depends on extent of UC in colon
 d. Risk of cancer irrespective of grade of dysplasia

IBD COMPLICATIONS

66. **Toxic megacolon is seen in:** (COMEDK 2009)
 a. Carcinoma colon
 b. Gastrocolic fistula
 c. Ulcerative colitis
 d. Amoebic colitis
67. **Toxic megacolon is seen in:** (MHPGMCET 2003)
 a. Crohn's disease
 b. Ulcerative colitis
 c. Amebic colitis
 d. Antibiotic associated colitis
68. **Treatment of choice in toxic megacolon:** (MHSSMCET 2005)
 a. Total colectomy
 b. Segmental resection
 c. Colostomy
 d. Clindamycin, Metronidazole, Steroids

69. **Toxic megacolon is seen in:** (Orissa 2011)
 a. Crohn's disease b. Ulcerative colitis
 c. Diverticulosis d. All of the above
70. **All of the following causes megacolon except:** (JIPMER GIS 2011)
 a. Parkinson's disease b. Hirschprung's disease
 c. Byler's syndrome d. Ulcerative colitis
71. **In which of the following conditions acquired. Secondary megacolon is seen?**
 a. Fissure in-ano
 b. Complete absence of parasympathetic ganglion cells
 c. Absence of sympathetic ganglion cells
 d. Rectal malignancy
72. **All of the following are known complications of ulcerative colitis except:** (PGI June 95)
 a. Stricture b. Perforation
 c. Toxic megacolon d. Carcinoma
73. **Toxic megacolon is a complication of:** (AIIMS 94)
 a. Ulcerative colitis b. Crohn's
 c. Aganglionic megacolon d. Ischemic colitis
74. **Toxic megacolon is a known complication of:** (AIIMS Nov 94)
 a. Pseudomembranous colitis
 b. Ulcerative colitis
 c. Amebic colitis
 d. Hirschprung's disease
75. **Toxic megacolon is seen in:** (AIIMS 87)
 a. Carcinoma colon
 b. Gastrocolic fistula
 c. Ulcerative colitis
 d. Carcinoid
 e. All of the above
76. **Most common cause of death in Crohn's disease is due to:** (AIIMS May 2009)
 a. Sepsis
 b. Thromboembolic complication
 c. Electrolyte disturbance
 d. Malignancy
77. **Incidence of pouchitis in patients treated for ulcerative colitis with IPAA is:** (JIPMER GIS 2011)
 a. 7–33% b. 7–15%
 c. 18–56% d. 6–8%
78. **All are true about pouchitis except:** (JIPMER GIS 2011)
 a. Probiotics have shown promising response
 b. Cause may be related to mucosal ischemia
 c. Most commonly seen in ulcerative colitis surgeries
 d. Episodes of pouchitis will not respond to antibiotics
79. **Most common complication of UC with IPAA:** (AIIMS GIS Dec 2010)
 a. Small bowel obstruction
 b. Pouchitis
 c. Pelvic sepsis
 d. Leak
80. **Most common cause of death in Crohn's disease is due to:** (AIIMS GIS Dec 2010)
 a. Sepsis
 b. Thromboembolic complication
 c. Electrolyte disturbance
 d. Malignancy
81. **Most common postoperative complication of IPAA in ulcerative colitis is:** (AIIMS Nov 2011)
 a. Pouchitis b. Pelvic abscess
 c. Small bowel obstruction d. Perianal complications
82. **A patient of Crohn's disease underwent resection anastomosis. Now present on 7th post-op day with anastomotic leak from a fistula. Every day leakage volume adds up to 150–200 ml. There is no intra-abdominal collection and the patient is stable without any complaints. What will be next line of management?** (AIIMS May 2012)
 a. Conservative treatment and leave him and hope for the spontaneous resolution
 b. Perform laparotomy and check for leakage site and healthy margins
 c. Perform laparotomy and completely exteriorize the fistula
 d. Perform laparotomy and place drain and leave

EXPLANATIONS

INFLAMMATORY BOWEL DISEASE

1. Ans. d. Mouth to anus : (Ref: Sabiston 19/e p1244-1254; Schwartz 10/e p1153-1157, 9/e p993-997; Bailey 26/e p1151-1156, 25/e p1169-1173; Shackelford 7/e p1966-1969)

CROHN'S DISEASE

- Chronic, transmural inflammatory disease of the GIT for which the cause is unknown^Q.
- Can involve any part of the alimentary tract from the mouth to the anus but most commonly affects the small intestine and colon^Q.

- Involvement of both large and small intestine: 55%^Q
- Involvement of only small intestine: 30%^Q
- Involvement of only large intestine: 15%^Q

- Crohn's disease primarily attacks young adults^Q in the 2nd and 3rd decades of life.
- More common in smokers and urban dwellers^Q
- Two genders are affected equally with strong familial association^Q

- Upper GI Crohn's disease is most frequently found in the gastric antrum and duodenum^Q.
- In patients with colonic disease, rectal sparing is characteristic^Q.

Etiology: Unknown

- Infectious agents proposed as potential causes: *Mycobacterium paratuberculosis* and measles virus^Q.
- The identification in 2001 of the CARD-15/NOD2 mutation^Q (on chromosome 16q, also known as IBD-1 locus) provided the first definitive genetic link to the condition and is relatively specific for Crohn's disease.

IBD-1 (chromosome 16q)	Relatively specific for Crohn's disease ^Q
IBD-2 (chromosome 12q)	More common in Ulcerative colitis ^Q

Pathology

- Diseased bowel separated by areas of grossly appearing normal bowel (skip areas)^Q
- Extensive fat wrapping caused by the circumferential growth of the mesenteric fat^Q around the bowel wall.
- Thickened, firm, rubbery, and almost incompressible bowel wall^Q.
- Involved segments are adherent to adjacent intestinal loops or other viscera, with internal fistulas^Q.
- Mesentery of the involved segment is thickened, with enlarged lymph nodes^Q.

- Earliest gross pathologic lesion is a superficial aphthous ulcer^Q noted in the mucosa.

- Linear ulcers may coalesce to produce transverse sinuses with islands of normal mucosa in between (cobblestone appearance)^Q
- Inflammatory reaction is characterized by extensive edema, hyperemia^Q lymphangiectasia, an intense infiltration of mononuclear cells, and lymphoid hyperplasia^Q.

- Characteristic histologic lesions of Crohn's disease are noncaseating granulomas with Langerhans' giant cells^Q.
- Granulomas appear later in the course and are found in the wall of the bowel or in regional lymph nodes^Q in 60-70% of patients

Clinical Features

- MC symptom is intermittent and colicky abdominal pain, most commonly noted in the lower abdomen^Q.
- Diarrhea is the next most frequent symptom and is present, at least intermittently, in about 85% of patients.
- In contrast to ulcerative colitis, patients with Crohn's disease typically have fewer bowel movements, and the stools rarely contain mucus, pus, or blood^Q.

- Main intestinal complications of Crohn's disease include obstruction and perforation^Q.
- Fistulas occur between the sites of perforation and adjacent organs, usually at the site of a previous laparotomy^Q.

- Long-standing Crohn's disease predisposes to cancer of the small intestine and colon^Q.
- Perianal disease (fissure, fistula, stricture, or abscess^Q) is common

- In Crohn's disease, ileum is the MC site of fistula (enterocutaneous and enterovesical), MC site of perforation and MC site of carcinoma^Q.

Diagnosis

- **Enteroclysis:** IOC for diagnosis of Crohn's disease
 - **Earliest radiographic findings in enteroclysis** are **aphthous ulceration**, a coarse villous pattern of the mucosa, and thickened folds
 - **Ulcerations on the mesenteric aspect with sacculation on the antimesenteric surface)**
- **Serology:** Anti-Saccharomyces cerevisiae (ASCA^Q) autoantibodies have **specificity of 92%** for Crohn's disease.

2. Ans. b. Crohn's disease
3. Ans. a. Crohn's disease
4. Ans. d. Rectum spared in 50% patients with large bowel involvement
5. None: Sabiston (Ref: 19/e p1247; Schwartz 9/e p995; Bailey 26/e p1156, 25/e p1166; Shackelford 7/e p1968)

Extraintestinal Manifestations of Crohn's Disease

- | | |
|---|---|
| <ul style="list-style-type: none"> • Skin: Erythema multiforme, Erythema nodosum, Pyoderma gangrenosum • Eyes: Iritis, Uveitis, Conjunctivitis • Blood: Anemia, Thrombocytosis, Phlebothrombosis, Arterial thrombosis | <ul style="list-style-type: none"> • Joints: Peripheral arthritis, Ankylosing spondylitis • Liver: Nonspecific triaditis, Sclerosing cholangitis • Kidney: Nephrotic syndrome • Pancreas: Pancreatitis • General: Amyloidosis |
|---|---|

6. Ans. d. All of the above (Ref: Sabiston 19/e p1399-1400; Schwartz 10/e p1153-1157, 9/e p1038; Bailey 25/e p1153, 25/e p1170-1171; Shackelford 7/e p1968)

CROHN'S DISEASE OF THE ANORECTUM

- **Anal manifestations** of Crohn's disease can be **most devastating** because of their **painful nature** and their **threat to the patient's continence**^Q
- Occur in nearly **20% of patients** with Crohn's disease.

- Typically presents in three ways: **Ulceration (MC^Q)**, fistula and stricture.
- Fistulas tend to be **chronic, indurated**, and **cyanotic** and are often **painless**^Q.

Clinical Features

- Patients may suffer from **fissures, fistulas**, and **abscesses**^Q.
- Symptoms and signs of **anal Crohn's disease** may include **pain, swelling, bleeding, soilage** or **frank incontinence**, and fever.
 - **Edematous, purplish tags** are characteristic of the disease.

Evaluation

- **Anorectal examination** should include **inspection, digital examination, anoscopy**, and **proctosigmoidoscopy**^Q.

Treatment

- Although **conservatism is paramount in importance**, patients should not be undertreated if treatment is indicated.
- **Surgery** is usually warranted for **pain** resulting from a **poorly draining** or **undrained abscess**^Q.
 - **Fissures** caused by Crohn's disease are **often multiple** and **located off the midline**; they usually **respond to conservative measures**^Q, such as sitz baths, stool softeners, and oral analgesics.
 - **Sphincterotomy** and **fissurectomy** should be **avoided** in **perianal Crohn's disease**^Q.
- **Infliximab**^Q has been **very successful** in the treatment of **fistulizing perianal Crohn's disease** with **closure rates** between 25% and 67%.
 - Most successful strategy is a staged approach to perianal disease.
 - Control of local sepsis is an essential first step^Q.
 - Abscesses need to be drained and fistula tracts require chronic drainage with non-cutting setons^Q.
 - Once the perianal sepsis is controlled, infliximab treatment is initiated.
 - After two to three infliximab infusions, the setons are removed to permit closure of the fistulas^Q.

- If the **fistulas do not close** and the **local sepsis has resolved**, **definitive surgical therapy** may be undertaken^Q.

7. Ans. a. Rectum
8. Ans. b. Enteroclysis
9. Ans. a. Transmural involvement with skip lesions

10. Ans. b. Stricture formation is present (Ref: Sabiston 19/e p1319-1330; Schwartz 10/e p1197-1198, 9/e p1035-1036; Bailey 26/e p1145-1151, 25/e p1163-1169; Shackelford 7/e p1961-1966)

ULCERATIVE COLITIS

- UC occurs **more commonly** in developed countries^Q
- More commonly affects patients **< 30 years**; **both genders** are **equally affected**^Q
- **More common** in **whites, Jews**, and persons of **northern European ancestry**^Q

Etiology

- Infectious agents, including *C. difficile* and *Campylobacter jejuni*^Q, have been implicated as playing a causative role in the pathogenesis, but such a role has not been confirmed.
- A **family history of IBD** is a **significant risk factor**^Q.

- **Smoking** appears to confer a **protective effect**^Q
- Both UC and **Crohn's disease** are **more common in women** who use **OCPs**^Q
- Patients who have had an **appendectomy** appear to be at **decreased risk for developing UC**^Q.

Pathology

- Major **pathologic process** involves the **mucosa** and **submucosa** of the colon, with **sparing** of the **muscularis**^Q.
- **Typical gross appearance**: **Hyperemic mucosa**^Q
- **Rectal involvement (proctitis)** is the **hallmark of the disease**^Q, and the diagnosis should be seriously questioned if the rectal mucosa is not affected.
- **Pseudopolyps**, or **inflammatory polyps** are seen in UC.
- **Diagnostic characteristic of UC**: **Continuous uninterrupted inflammation** of the colonic mucosa, **beginning in the distal rectum** and **extending proximally**^Q to a variable distance.

- **Most characteristic lesion of UC**: **Crypt abscess**^Q (collections of neutrophils fill and expand the lumina of individual crypts of Lieberkühn)
- **Crypt abscesses** are **not specific for UC**^Q and can be seen in Crohn's disease and infectious colitis.

- **Crypt branching** may be seen in **chronic UC** and is an **important characteristic**^Q.
- The **number of goblet cells** in the crypts is **diminished**, as is mucus production.

Clinical Features

- **Diarrhea** with **passage of mucus**^Q
- **More urgency** than with Crohn's disease, because of **distal proctitis**^Q.
- **Rectal bleeding** is common in UC

- **Rectal involvement** is present in almost **100%** of patients with UC, whereas anal involvement is rare.
- **Crohn's disease** may have **normal rectal mucosa** (so-called **rectal sparing**^Q), although **anal disease** (e.g. fissures, fistulas, abscesses) is **common**^Q.

Diagnosis

- In the **acute phase** of UC, **proctosigmoidoscopy** is sufficient because the rectum is invariably inflamed.
- **Double contrast barium enema**: Primary radiologic tool for **confirming the diagnosis** and assessing the **extent** and **severity** of UC.

- **End stage or burned out UC** is characterized radiographically by **shortening of the colon**, **loss of normal redundancy** in the **sigmoid region** and at the **splenic** and **hepatic flexures**, **disappearance of the haustral pattern**, a **featureless mucosa**, absence of discrete ulceration and **narrow caliber** of the bowel.
- Approximately **15–20%** of patients with **severe UC** have an associated **backwash ileitis**, characterized by a **fixed, patulous ileocecal valve** and a **dilated, granular terminal ileum** on **double contrast barium studies**^Q.

- **p-ANCA** is having **92% specificity** for UC^Q.
- Disease severity of UC can be graded by **Modified Truelove and Witts Classification**^Q.

11. Ans. c. Crohn's disease

12. Ans. a. In Crohn's disease

13. Ans. a. Hyperplastic polyps, b. Diverticulosis

(Ref: Sabiston 19/e p1249, 1320; Schwartz 10/e p1201-1203, 9/e p993-997, 1033-1038; Bailey 26/e p1145-1156, 25/e p1163-1173; Shackelford 7/e p1962)

Feature	Crohn's Disease	Ulcerative Colitis
A. Macroscopic features		
1. Distribution	Segmental with skip areas ^Q	Continuous without skip areas ^Q
2. Location	Commonly terminal ileum and/or ascending colon	Commonly rectum , sigmoid colon and extending upwards
3. Extent	Usually involves the entire thickness of the affected segment of bowel wall	Usually superficial , confined to mucosal layers
4. Ulcers	Serpiginous ulcers , that may develop into deep Fissures ^Q	Superficial mucosal ulcers without fissures
5. Pseudopolyps	Rarely seen	Commonly present ^Q
6. Fibrosis	Common	Rare
7. Shortening	Due to fibrosis	Due to contraction of muscularis
B. Microscopic features		
1. Depth of inflammation	Typically transmural ^Q	Mucosal^Q and Submucosal
2. Type of inflammation	Non-caseating granulomas ^Q and infiltrate of mononuclear cells (lymphocytes, plasma cells and macrophage)	Crypt abscess and non-specific acute and chronic inflammatory cells (lymphocytes, plasma cells neutrophils, eosinophils, mast cells)
3. Mucosa	Patchy ulceration	Hemorrhagic mucosa with ulceration
4. Submucosa	Widened due to edema and lymphoid aggregates	Normal or reduced in width
5. Muscularis	Infiltrated by inflammatory cells	Usually spared, except in cases of Toxic Megacolon ^Q
6. Fibrosis	Present	Usually absent
C. Complications		
1. Fistula formation	Internal and external fistulae in 10% case	Extremely rare ^Q
2. Malignant changes	Less common but present	May occur in disease of more than 10 years duration (more common ^Q)
3. Fibrous strictures	Common ^Q	Never ^Q
4. Toxic megacolon	—	Risk present ^Q
5. Named Features	Hose pipe appearance ^Q Cobble-stone appearance ^Q Halo sign on CT ^Q String sign of Kantor ^Q Raspberry/rosethorn appearance ^Q	Garden hose appearance ^Q Pseudopolyps ^Q Pipestem colon (Ahastral) ^Q
Remember		
<ul style="list-style-type: none"> • Earliest change in Crohn's disease is- Aphthoid ulceration^Q. • Earliest Change in Ulcerative colitis is- Blurring of mucosal stripe and granular appearance^Q. • Surgery is palliative in Crohn's disease^Q whereas curative in ulcerative colitis^Q. 		

14. Ans. d. Through and through involvement of thickness of bowel wall

15. Ans. a. Regional ileitis (Crohn's disease)

16. Ans. a. Ulcerative colitis

17. Ans. c. Crohn's disease

18. Ans. b. Rectum

19. Ans. d. Rectum

20. Ans. a. Pseudopolyps

21. Ans. c. Mucosa, e. Submucosa

22. Ans. a. Ulcerative colitis, c. Crohn's disease

23. Ans. a. Crohn's disease (Ref: Sabiston 19/e p1247, 1313, 1351; Smith 17/e p581)

COMMON CAUSES OF COLOVESICAL FISTULA

- Diverticulitis (50–60% More common in patients > 40 years^Q)
- CA colon (20–25% More common in patients > 50 years^Q)
- Crohn's disease 10% Seen in 2nd to 3rd decade^Q

24. Ans. d. Rectum

25. Ans. c. Rectum is always involved

26. Ans. c. Terminal ileum

27. Ans. c. Diagnosis of toxic megacolon (Ref: Bailey 25/e p1165)

Colonoscopy is not done in toxic colon for the fear of aggravating the disease or perforation.

INDICATIONS OF COLONOSCOPY AND BIOPSY IN ULCERATIVE COLITIS

- To establish the extent of inflammation^Q
- To distinguish between UC and Crohn's disease^Q
- To monitor the response of treatment^Q
- To assess long standing cases for malignant change^Q

28. Ans. a. NOD2/CARD-15 gene

29. Ans. a. Smoking has a protecting effect

30. Ans. d. Crohn's disease

31. Ans. a. Cologastric, c. Colovesical, d. Coloduodenal, e. Colovaginal (Ref: Sabiston 19/e p1247; Harrison 18/e p2483)

- Sabiston says "Fistula may develop between intestine and any other intra-abdominal organ, including bladder, bowel, uterus, vagina and stomach."
- Harrison says "Fistula involving stomach or duodenum arise from the small or large bowel and do not necessarily signify the presence of upper GI tract involvement."

32. Ans. a. All layer are involved, b. Malabsorption

- Both are the features of Crohn's disease.

33. Ans. d. Crypt abscess

34. Ans. a. Premalignant condition

35. Ans. a. Transmural inflammation

36. Ans. a. Crohn's disease

IBD EXTRAINTESTINAL MANIFESTATIONS

37. Ans. b. PSC. (Ref: Sabiston 19/e p1322; Schwartz 10/e p1197-1198, 9/e p1034; Bailey 25/e p1166; Shackelford 7/e p1962)

Extraintestinal Manifestations of Ulcerative Colitis	
<ul style="list-style-type: none"> • Arthritis • Ankylosing spondylitis • Erythema nodosum 	<ul style="list-style-type: none"> • Pyoderma gangrenosum • Primary sclerosing cholangitis (PSC)

- Colectomy has no effect on the course of PSC in UC^Q.
- Pyoderma gangrenosum is more common in UC^Q.
- EPASU is more common in Crohn's disease^Q.
- EPASU: Erythema nodosum, Peripheral arthritis, Ankylosing spondylitis, Stones (Cholelithiasis and oxalate stones), Ureteral obstruction^Q.
- MC cutaneous manifestation of IBD: Erythema nodosum^Q
- Erythema nodosum is the most responsive to treatment of the bowel and persistence of the lesion indicates inadequate control of IBD^Q.

38. Ans. c. PSC

39. Ans. a. Ulcerative colitis

40. Ans. b. Circinate balanitis

- Circinate balanitis is seen in Reiter's syndrome, not in ulcerative colitis.

41. Ans. a. Primary sclerosing cholangitis

42. Ans. a. Peptic ulceration

43. Ans. a. Calcium oxalate

44. Ans. a. Oxalate (Ref: Harrison 18/e p2488)

UROLOGIC MANIFESTATIONS OF IBD

- The most frequent genitourinary complications are calculi, ureteral obstruction, and ileal bladder fistulas^Q.
- Calcium oxalate stones develop secondary to hyperoxaluria, which results from increased absorption of dietary oxalate^Q.
- Normally, dietary calcium combines with luminal oxalate to form insoluble calcium oxalate, which is eliminated in the stool.
- In patients with ileal dysfunction, nonabsorbed fatty acids bind calcium and leave oxalate unbound^Q.
- The unbound oxalate is then delivered to the colon, where it is readily absorbed, especially in the presence of inflammation^Q.

IBD TREATMENT

45. Ans. c. Proctocolectomy with ileonal anastomosis (Ref: Sabiston 19/e p1324-1329; Schwartz 10/e p1187-1188, 9/e p1035-1036; Bailey 26/e p1146-1151, 25/e p1167-1173; Shackelford 7/e p1974)

Indications of Surgery in Ulcerative Colitis	
<ul style="list-style-type: none"> Intractability^Q Dysplasia, carcinoma^Q 	<ul style="list-style-type: none"> Massive colonic bleeding^Q Toxic megacolon^Q

Surgical Options for Ulcerative Colitis	
<ul style="list-style-type: none"> Total proctocolectomy with ileostomy Restorative proctocolectomy with IPAAQ Total proctocolectomy with a continent ileal reservoir (Kock pouch)^Q 	<ul style="list-style-type: none"> Total abdominal colectomy with end-ileostomy Toxic megacolon^Q

Indications of Surgery in Ulcerative Colitis					
Total Proctocolectomy With End Ileostomy					
<ul style="list-style-type: none">• Total proctocolectomy has the advantage of removing all diseased mucosa, thereby preventing further inflammation and the potential for progression to dysplasia or carcinoma^Q.• Major disadvantage: Need for a permanent ileostomy• Older patients, those with poor sphincter function, and patients with carcinomas in the distal rectum may be candidates for this procedure^Q.					
Total Proctocolectomy With Continent Ileostomy					
<ul style="list-style-type: none">• The major problem with the Kock pouch is the high complication rate necessitating reoperation in up to 50% of patients^Q.• MC problem is a slipped valve, which occurs when the intussuscepted limb everts and the continent nipple is lost.• Other complications: Inflammation of the ileal pouch mucosa (so-called pouchitis) in 15% to 30% of cases, fistula formation (10%), and stoma stricture (10%).• The Kock procedure should not be performed in obese patients, debilitated patients, or any patient with a physical or mental handicap^Q that would prohibit safe catheterization of the reservoir.• The procedure is contraindicated in patients with Crohn's disease because of the high incidence of its recurrence, causing failure of the pouch.					
Total Proctocolectomy With Ileal Pouch-Anal Anastomosis (IPAA)					
<ul style="list-style-type: none">• Restorative proctocolectomy with IPAA has become the most common definitive operation for the surgical treatment of UC.					
<table><tr><th colspan="2">Complications of Total Proctocolectomy With IPAA</th></tr><tr><td>Pouchitis (7–33%)^Q Small bowel obstruction (up to 27%) Pelvic sepsis</td><td>Anastomotic and pouch suture line leaks Pouch-vaginal fistula</td></tr></table>		Complications of Total Proctocolectomy With IPAA		Pouchitis (7–33%)^Q Small bowel obstruction (up to 27%) Pelvic sepsis	Anastomotic and pouch suture line leaks Pouch-vaginal fistula
Complications of Total Proctocolectomy With IPAA					
Pouchitis (7–33%)^Q Small bowel obstruction (up to 27%) Pelvic sepsis	Anastomotic and pouch suture line leaks Pouch-vaginal fistula				

- Older patients or those with fecal incontinence should undergo a total proctocolectomy with an end ileostomy.
- Younger patients with no evidence of rectal dysplasia should undergo restorative proctocolectomy and IPAA with a double-stapled anastomosis and diverting loop ileostomy.
- Patients with confirmed rectal dysplasia should be treated with mucosectomy and a hand-sewn IPAA.
- Patients with significant debility who are poor operative candidates should undergo a total abdominal colectomy with a very low Hartmann closure and an end ileostomy.

46. Ans. b. Done in cases where medical treatment fails, c. Pouch surgery done
47. Ans. c. Extraintestinal complication (Ref: Harrison 18/e p2493)

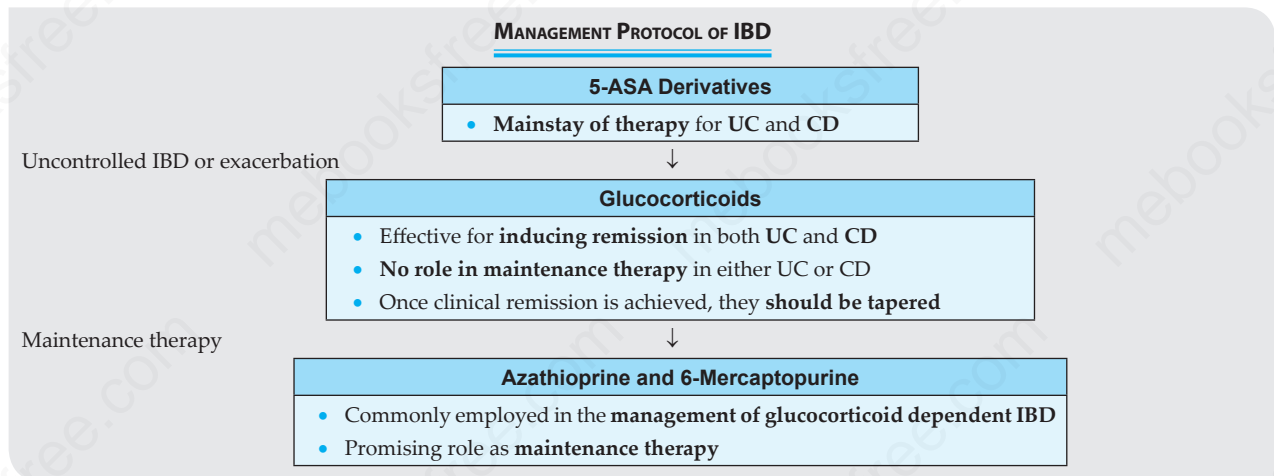
Indications for Surgery in IBD		
Ulcerative Colitis	Crohn's Disease	
	Small Intestine	Colon and rectum
<ul style="list-style-type: none"> Intractable disease Fulminant disease^Q Toxic megacolon^Q Colonic perforation^Q Massive colonic hemorrhage^Q Extracolonic disease Colonic obstruction^Q Colon cancer prophylaxis Colon dysplasia or cancer 	<ul style="list-style-type: none"> Stricture and obstruction unresponsive to medical therapy^Q Massive hemorrhage^Q Refractory fistula^Q Abscess^Q 	<ul style="list-style-type: none"> Intractable disease^Q Fulminant disease^Q Perianal disease unresponsive to medical therapy Refractory fistula^Q Colonic obstruction^Q Cancer prophylaxis^Q Colon dysplasia or cancer

48. Ans. c. 2% case of Crohn's disease undergo malignant changes (Ref: Sabiston 19/e p1326-1329; Schwartz 9/e p1036; Bailey 26/e p1150-1151, Shackelford 7/e p1982)

- Pouch operation (total proctocolectomy with IPAA) is not done during fulminant ulcerative colitis^Q.
- Fulminant ulcerative colitis not responding to medication is an indication for emergency operation. In emergency operations, total abdominal colectomy with ileostomy is done.
- The risk of malignancy in Crohn's pancolitis is similar to UC pancolitis, i.e. 2% after 10 years, 8% after 20 years and 18% after 30 years approximately^Q.

49. Ans. d. Salazopyrin (Ref: Sabiston 19/e p1249-1250, 1324-1325; Schwartz 9/e p1034-1035; Bailey 26/e p1148, 25/e p1166, 1172; Shackelford 7/e p1969-1973)

- Salazopyrin is brand name of sulfasalazine.



50. Ans. b. Formation of prostaglandins (PG) (Ref: Harrison 18/e p2489; Shackelford 7/e p1970)

- 5-ASA compounds exert its local anti-inflammatory effect by inhibiting leukotriene production (PG synthesis) by inhibition of 5-lipoxygenase activity; also inhibits the production of IL-1 and TNF^Q

Commonly Used 5-ASA Formulations in IBD
<ul style="list-style-type: none"> • Sulfasalazine • Oral mesalamine agents • Azo compounds: Balsalazide, Olsalazine

51. Ans. d. Total colectomy and ileostomy

52. Ans. b. Sulfasalazine

53. Ans. b. Prednisolone

54. Ans. a. Toxic megacolon, b. Massive colonic hemorrhage, d. Colonic perforation

55. Ans. a. Complete proctectomy with Brooke ileostomy

56. Ans. a. Total proctocolectomy with IPAA 57. Ans. b. Pancolitis

58. Ans. c. 5-ASA reduces small bowel obstruction

COLITIS ASSOCIATED CARCINOMA

59. Ans. b. 20% after 30 years (Ref: Schwartz 10/e p1195, 1197-1198, 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165-1166; Shackelford 7/e p1964)

- The risk of malignancy in Crohn's pancolitis is similar to UC pancolitis, i.e. 2% after 10 years, 8% after 20 years and 18% after 30 years approximately^Q.

60. Ans. a. Onset in childhood, b. Extensive involvement of colon (Ref: Sabiston 19/e p1322-1324; Schwartz 10/e p1195, 1197-1198, 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165-1166; Shackelford 7/e p1963-1965)

Risk Factors for Cancer in Ulcerative Colitis patient
<ul style="list-style-type: none"> • The duration of colitis^Q • The extent of colonic involvement^Q • The presence of concomitant PSC and family history of CRC^Q (regardless of the family history of IBD) • Pancolitis (disease extending proximal to the splenic flexure) and disease diagnosed at a young age^Q

- UC-related CRC tends to be **multicentric** and **evenly distributed** throughout the colon. Tumour tend to be **infiltrative, highly aggressive** and **poorly differentiated**^Q.
- No significant difference between sporadic and UC-related CRC with respect to **prognosis**^Q.

61. Ans. b. Left sided is more common (Ref: Sabiston 19/e p1322-1324; Schwartz 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165-1166; Shackelford 7/e p1963-1965)

Colitis Associated Colon Cancer (CAC)	Sporadic Colon Cancer (SCC)
<ul style="list-style-type: none"> • Arise from flat dysplasia or dysplasia associated lesion or mass^Q • Multiple synchronous colon cancer in 12%^Q • Mean age: 30 years^Q • Distributed uniformly^Q throughout the colon • Mucinous or anaplastic cancers are more common^Q 	<ul style="list-style-type: none"> • Arise from adenomatous polyps^Q • Multiple synchronous colon cancer in 3–5%^Q • Mean age: 60 years^Q • Left side predominance^Q • Mucinous or anaplastic cancers are less common^Q

62. Ans. b. Dysplastic sites

63. Ans. d. Arise from pseudo polyps

64. Ans. c. Poor prognosis as compared to sporadic

65. Ans. d. Risk of cancer irrespective of grade of dysplasia

IBD COMPLICATIONS

66. Ans. c. Ulcerative colitis (Ref: Sabiston 19/e p1324-1325; Schwartz 10/e p1195,1198,1199, 9/e p1034; Bailey 26/e p1146, 25/e p1164; Shackelford 7/e p1965-1966)

TOXIC MEGACOLON

- Toxic megacolon is a **serious life-threatening condition** that can occur in patients with **ulcerative colitis, Crohn's colitis, and infectious colitides** such as **pseudomembranous colitis**^Q
- This **decompensation** results in a **necrotic thin-walled bowel** in which **pneumatosis**^Q can often be seen radiographically.

Management:

- Medical treatment is associated with a **high rate of recurrence** with subsequent **urgent operation**^Q has been reported.
- Aggressive **preoperative stabilization** is required, using **volume resuscitation** with **crystalloid solutions** to prevent dehydration secondary to third-space fluid losses, stress-dose steroids for patients previously on steroid therapy, and **broad-spectrum antibiotics**^Q.

- Total abdominal colectomy with ileostomy and preservation of the rectum is **treatment of choice** for toxic megacolon^Q.
- It serves the **main purpose of removing the diseased colon** and **avoiding a difficult and morbid pelvic dissection**^Q.

67. Ans. b. Ulcerative colitis a. Crohn's disease

68. Ans. a. Total colectomy

69. Ans. b. Ulcerative colitis a. Crohn's disease

70. Ans. c. Byler's syndrome (Ref: Bailey 26/e p1177-1178, 25/e p1155-1156; en.wikipedia.org/wiki/Megacolon)

MEGACOLON

- Megacolon is abnormal dilation of colon
- Dilation is often accompanied by paralysis of the peristaltic movements of the bowel.

- Total abdominal colectomy with ileostomy and preservation of the rectum is **treatment of choice** for toxic megacolon^Q.
- It serves the **main purpose of removing the diseased colon** and **avoiding a difficult and morbid pelvic dissection**^Q.

Organ	Diameter in megacolon
Cecum Cecum	> 12 cm ^Q
Ascending colon	> 8 cm
Transverse colon	> 5.5 cm ^Q
Rectosigmoid or descending colon	> 6.5 cm

Etiology of Megacolon

- Congenital or aganglionic megacolon (Hirschprung's disease^Q)
- Medications (antipsychotics^Q)
- Acquired megacolon
 - Idiopathic megacolon
 - Toxic megacolon (UC and pseudomembranous colitis^Q)
 - Infection: Clostridium difficile^Q
 - Neurologic, metabolic and Systemic diseases (Chagas disease, Parkinsonism^Q)

71. Ans. d. Rectal malignancy

72. Ans. a. Stricture (Ref: Sabiston 19/e p1321; Schwartz 10/e p1195,1198,1199, 9/e p1034; Bailey 26/e p1145, 25/e p1163; Shackelford 7/e p1962)

- Inflammation is purely mucosal in ulcerative colitis, strictures are highly uncommon. Any stricture diagnosed in a patient with ulcerative colitis is presumed to be malignant until proven otherwise.

73. Ans. a. Ulcerative colitis

74. Ans. b. Ulcerative colitis

75. Ans. c. Ulcerative colitis

76. Ans. d. Malignancy (Ref: Sabiston 19/e p1254)

- Long-term survival studies have suggested that patients with Crohn's disease have a death rate that is about two to three times higher than that in the general population.
- Gastrointestinal cancer^Q remains the leading cause of disease-related death in patients with Crohn's disease; other causes of disease-related deaths include sepsis, thromboembolic complications, and electrolyte disorders.

77. Ans. a. 7–33% (Ref: Sabiston 19/e p1329; Schwartz 10/e p1194, 9/e p1032; Shackelford 7/e p1995–1997)

POUCHITIS

- Inflammation of the mucosa of the ileal pouch, or pouchitis, occurs in 7–33% of patients with UC treated by IPAA^Q.
- The cause is unknown but may be related to bacterial overgrowth, mucosal ischemia, or other local factors^Q.

Clinical features:

- Pouchitis typically presents with increased stool frequency, fever, bleeding, cramps, and dehydration^Q.

Treatment:

- Episodes usually respond to rehydration and oral antibiotics, usually metronidazole or ciprofloxacin^Q.
- Probiotics have been reported to provide dramatic resolution in some cases of pouchitis resistant to antibiotic therapy^Q.
- The diagnosis of Crohn's disease must also be entertained in patients with significant pouchitis that does not respond to medical treatment^Q.

78. d. Episodes of pouchitis will not respond to antibiotics

79. b. Pouchitis

80. d. Malignancy

81. a. Pouchitis

82. a. Conservative treatment and leave him and hope for the spontaneous resolution (Ref: Sabiston 19/e p1270–1272; Schwartz 9/e p997–998; Bailey 26/e p1179–1180, 25/e p1184–1185; Shackelford 7/e p944–946)

TREATMENT OF ENTEROCUTANEOUS FISTULA

- Successful management requires establishment of controlled drainage, usually using a sump suction apparatus; management of sepsis; prevention of fluid and electrolyte depletion; protection of the skin; and provision of adequate nutrition^Q.
- When sepsis has been controlled and nutritional therapy has been instituted, a course of conservative management^Q should be followed.

- Most of these fistulas heal spontaneously within 4–6 weeks of conservative management^Q. If closure is not accomplished after this time, surgery is indicated.

- This period of conservative management not only allows those fistulas to heal spontaneously but also allows for optimization of nutritional status and control of the wound and fistula sites^Q.
- Also, a reasonable delay permits the peritoneal reaction and inflammation to subside, thus making a second operation easier and safer^Q.

- Preferred operation: Fistula tract excision and segmental resection of the involved segment of intestine and reanastomosis^Q.

- Simple closure of the fistula after removing the fistula tract almost always results in a recurrence of the fistula.
- If an unexpected abscess is encountered or if the bowel wall is rigid and distended over a long distance, thus making primary anastomosis unsafe, exteriorization of both ends of the intestine should be accomplished.

Vermiform Appendix

MULTIPLE CHOICE QUESTIONS

ACUTE APPENDICITIS

- Most common initiating factor in acute appendicitis is:** (JIPMER GIS 2011)
 - Luminal obstruction
 - Bacterial infection
 - Lymphoid hyperplasia
 - Perforation
- Appendicitis is diagnosed by:** (PGI June 2003)
 - TLC and DLC
 - X-ray abdomen
 - USG
 - Colour Doppler
- When acute appendicitis is suspected, it can be confirmed by:** (PGI June 2007, June 2002)
 - Clinical examination
 - USG
 - CT scan
 - Blood counts
- True about appendicular rupture is all except:** (PGI Dec 99)
 - Common in extremes of age
 - Common in people with fecolith obstruction
 - Early antibiotics prevent rupture
 - Appendectomy is done always in presence of rupture
- Most dangerous position of appendix is:** (Recent Question 2015)
 - Retrocecal
 - Paracolic
 - Pelvic
 - Retroperitoneal
- In a case of retrocecal appendicitis which movement aggravates pain?** (AIIMS Nov 2007)
 - Flexion
 - Extension
 - Medial rotation
 - Lateral rotation
- Earliest symptoms in acute appendicitis is:** (DNB 2003, JIPMER 86, 87, Kerala 87)
 - Pain
 - Fever
 - Vomiting
 - Rise of pulse rate
- A patient with Crohn's disease was opened and an inflamed appendix found. The treatment of choice is:** (PGI 88)
 - Appendectomy
 - Ileocolic resection and anastomosis
 - Close the abdomen and start medical treatment
 - None of the above
- When the rectum is inflated with air through a rectal tube, pain and tenderness occur in the right iliac fossa in case of appendicitis? This is known as:** (Recent Question 2014, AIIMS 81, AMU 85)
 - Aaron's sign
 - Battle's sign
 - Bastedo sign
 - MC Burney's sign
- The frequent mechanism in perforation of appendix is:** (DNB 89, 91)
 - Impacted faecolith
 - Tension gangrene due to the accumulating secretions
 - Necrosis of lymphoid patch
 - Retrocaecal infection
- Acute appendicitis is due to:** (AIIMS 90, AMU 90)
 - Faecolith
 - Worms of ileo-caecal region
 - Streptococcal infections
 - Abuse of purgatives
 - None of the above
- All are useful in acute appendicitis except:** (Kerala 94)
 - Antibiotics
 - Analgesics
 - IV Fluids
 - Purgation
- Most common organism isolated from perforated appendicitis:** (AIIMS GIS May 2008)
 - E. coli
 - Pseudomonas
 - Klebsiella
 - Enterococcus
- Diffuse peritonitis following appendicitis is usually seen:** (NEET 2013, ICS 2000)
 - When appendicular perforation occurs early (within 24 hours)
 - When perforation occurs late (after 24 hours)
 - Particularly in non-obstructive appendicitis
 - When antibiotics are withheld
- All of the following signs are not seen in acute appendicitis except:** (TN 2001)
 - Rovsing's
 - Murphy's
 - Boa's sign
 - Mack wen's sign
- All are to be done in case of 20-years old female coming to casualty with right iliac fossa pain, with local guarding and tenderness, except:** (AIIMS Nov 99)
 - IV glucose
 - Pethidine 100 mg IM
 - Nil orally
 - X-ray abdomen
- Aaron's sign is seen in:** (AIIMS 81, 86)
 - Achalasia cardia
 - Hiatus hernia
 - Mediastinum emphysema
 - Acute appendicitis
- Rovsing's sign is seen in:** (PGI 95)
 - Acute appendicitis
 - Acute cholecystitis
 - Pancreatitis
 - None
- Acute appendicitis is characterized by all of the following except:** (MCI Sept 2005)
 - Anorexia
 - Rovsing's sign
 - Fever >42 degree Celsius
 - Periumbilical colic

20. A 15-years old boy is admitted with a history and physical finding consistent with appendicitis. Which of the following findings is most likely to be positive? (COMEDK 2004)
- Pelvic crepts
 - Iliopsoas sign
 - Murphy's Sign
 - Flank ecchymosis
21. False about appendicitis in children: (JIPMER 2011)
- Localized pain is the single most important symptom
 - Vomiting precedes abdominal pain
 - Perforation occurs in 80% of cases <5 years
 - 60% perforation occurs within 48 hours
22. Alvarado scoring in appendicitis includes all except: (PGI Nov 2011)
- Migratory right iliac fossa pain
 - Nausea
 - Elevated temperature
 - Leucopenia
 - Shift to right
23. Most common occurrence before appendicitis:
- Blockage of lumen
 - Ileitis
 - Gastroenteritis
 - Perforation
24. In appendicitis, the initial periumbilical pain is eventually localized to right iliac fossa because of:
- Peritoneum
 - Iliopsoas
 - Colon
 - Caecum
25. Which of the following clinical signs is not associated with acute appendicitis? (MHPGMCET 2009)
- Pointing sign
 - Rovsing's sign
 - Cullen's sign
 - Obturator sign
26. "Ten horn" sign is a feature of: (MHSSMCET 2011)
- Rectus muscle hematoma
 - Acute pancreatitis
 - Choledocholithiasis
 - Acute appendicitis
27. Alvarado scale is for: (DNB 2012, MHSSMCET 2011)
- Diverticulitis
 - Mesenteric lymphadenitis
 - Acute appendicitis
 - Pelvic abscess
28. Which of the following organisms produces signs and symptoms that mimic acute appendicitis? (Recent Question 2015)
- Enteropathic Escherichia coli
 - Enterobius vermicularis
 - Trichomonas hominis
 - Yersinia enterocolitica
29. Alvarado score consists of: (Recent Question 2013)
- Leucopenia
 - Anorexia
 - Diarrhea
 - Periumbilical pain
30. Most common differential diagnosis for appendicitis: (Recent Question 2013)
- Gastroenteritis
 - Mesenteric lymphadenopathy
 - Intussusception
 - Meckel's diverticulitis
31. Investigation of choice for acute appendicitis in children: (AIIMS May 2015, November 2014, May 2013)
- CT scan
 - Ultrasound
 - MRI
 - X-ray

APPENDICITIS IN PREGNANCY

32. Regarding appendicitis in pregnancy, false is: (ILBS 2011)
- MC cause of acute abdomen in first trimester
 - Pregnancy doesn't increase the risk
 - Conservative management by antibiotics should be tried
 - After rupture, fetal mortality is around 30–40%

33. A pregnant female presents with pain in abdomen on examination, tenderness is found in right lumbar region. TLC is 12,000/cmm, and urine examination is normal, for diagnosis further test done is: (AIIMS June 99)
- Chest X-ray with abdominal shield
 - Ultrasound abdomen
 - Non contrast CT abdomen
 - Laparoscopy
34. Which is the best test for diagnosis of acute appendicitis in a pregnant female? (MHSSMCET 2008)
- Alder's test
 - Aaron's test
 - Angell's test
 - Mc Burney's test

OCHSNER-SHERREN REGIME

35. Ochsner-Sherren regime is used in management of: (JIPMER 92)
- Appendicular abscess
 - Chronic appendicitis
 - Appendicular mass
 - Acute appendicitis
36. Ochsner-Sherren regimen is used for treatment of: (DNB 2012, 2000, MHPGMCET 2005)
- Appendicular abscess
 - Appendicular mass
 - Acute appendicitis
 - Appendicular mucocoele
37. A 26-years old male presented with 4 day history of pain in the right sided lower abdomen with frequent vomiting. Patients general condition is fair and clinically a tender lump was felt in the right iliac fossa. Most appropriate management for this case would be: (Recent Question 2014)
- Exploratory laparotomy
 - Immediate appendectomy
 - Ochsner-Sherren regimen
 - External drainage
38. True about appendicular mass is all except: (DPG 2006)
- Ochsner-Sherren regime followed
 - Develops after 72 hours
 - Fever is present
 - Operation is to be done immediately
39. Ochsner Sherren regimen is for: (MHSSMCET 2005, MAHE 2000)
- Appendicular perforation
 - Colonic mass
 - Appendicular lump
 - Appendicular abscess
40. A 25-years old man presents with 3 days history of pain in the right lower abdomen and vomiting. Patient's general condition is satisfactory and clinical examination reveals a tender lump in right iliac fossa. The most appropriate management in this case would be: (Recent Question 2015)
- Immediate appendectomy
 - Exploratory laparotomy
 - Ochsner-Sherren regimen
 - External drainage

NEOPLASM OF APPENDIX

41. Most common neoplasm of appendix is: (Recent Question 2015, AIIMS Nov 93)
- Lymphoma
 - Adenocarcinoma
 - Leiomyosarcoma
 - Argentaffinoma
42. A 25-years old patient presented with mass in right iliac fossa, which after laparotomy was found to be carcinoid of 2.5 cm in diameter. What will be next step in management? (NEET 2013, AIIMS Nov 2000)
- Segmental resection
 - Appendectomy
 - Right hemicolectomy
 - Do yearly 5-HIAA assay

43. What is the treatment of patient with carcinoid tumor of appendix of size more than 2 cm? (AIIMS June 99)

- a. Right hemicolectomy
- b. Appendectomy
- c. Appendectomy + abdominal CT scan
- d. Appendectomy + 24 hours urinary HIAA

44. Mucocele of the appendix is: (All India 89)

- a. Benign tumour
- b. Low grade malignancy
- c. Retention cyst
- d. Infective process

45. Treatment of an incidentally detected appendicular carcinoid measuring 2.5 cm is: (MCI March 2009)

- a. Right hemicolectomy
- b. Limits resection of the right colon
- c. Total colectomy
- d. Appendectomy

46. All are true about carcinoid tumor of appendix except:

- a. Present at tip (PGI SS June 2001)
- b. Right hemicolectomy is treatment of choice
- c. Constitute 50% of GI carcinoid
- d. Carcinoid syndrome is rare

47. Most common tumor occurring in appendix: (JIPMER 2010)

- a. Melanoma
- b. Carcinoid tumor
- c. Adenocarcinoma
- d. Mucinous carcinoma

48. Treatment of choice for mucinous adenocarcinoma of appendix: (MHSSMCET 2009)

- a. Right hemicolectomy
- b. Appendectomy
- c. Percutaneous aspiration
- d. Total colectomy

APPENDECTOMY

49. Grid-iron incision was first described by: (MHSSMCET 2005)

- a. McArthur
- b. Rutherford Morrison
- c. Hamilton Bailey
- d. Lanz

50. Stump size in appendectomy should not be more than:

- a. 1 mm
- b. 2 mm (MHSSMCET 2010)
- c. 3 mm
- d. 4 mm

51. During appendectomy if it is noticed that base of appendix is inflamed then further line of treatment is:

(DPG 2011, PGI 96)

- a. No appendectomy
- b. No burying of stump
- c. Hemicolectomy
- d. Cecal resection

52. The nerve commonly damaged during McBurney's incision is: (Bihar PG 2014, All India 2003)

- a. Subcostal
- b. Iliohypogastric
- c. 11th thoracic
- d. 10th thoracic

53. Which of the following statements is not true of McBurney's incision? (Karnataka 94)

- a. Most suitable if the diagnosis of appendicitis is definite
- b. If it is converted into a muscle cutting incision it is called Rutherford Morison's incision
- c. Inguinal hernia is a sequelae of the incision
- d. The incision can be extended upwards or downwards

54. A Gridiron incision becomes a Rutherford Morison's incision is extended by: (Karnataka 94)

- a. Splitting the muscles laterally
- b. Cutting the muscles laterally
- c. Cutting the muscles medially into the rectus sheath
- d. Incising vertically along the rectus muscle

55. Which one of the following is a muscle-splitting incision?

- a. Kocher's (ICS 2005)
- b. Rutherford-Morrison

- c. Pfannenstiel
- d. Lanz

56. An appendicular fistula is least likely to heal if: (Kerala 98)

- a. The stump was sutured with vicryl
- b. There is stenosis/narrowing of the sigmoid colon
- c. Superadded infection
- d. None

57. All of the following are early complications arising after appendectomy for acute appendicitis except:

(AIIMS 81, Rohtak 88)

- a. Ileus
- b. Sterility
- c. Intestinal obstruction
- d. Pulmonary complications

58. Fecal fistula after appendectomy may occur due to:

(MHPGMCET 2003)

- a. Adhesions
- b. Gangrenous appendicitis
- c. Undiagnosed ileo-cecal disease
- d. Postoperative infection

59. Nerve most commonly injured in Mac Burneys incision:

(Recent Questions 2013)

- a. Subcostal
- b. Iliohypogastric nerve
- c. 11th thoracic
- d. Ilioinguinal

APPENDIX ANATOMY AND PHYSIOLOGY

60. All are true about appendicular artery except: (DPG 97)

- a. Supplies only appendix
- b. Supplies terminal ileum also
- c. Is an end artery
- d. Branch of lower division of ileocolic artery

61. True statement about appendix:

(PGI June 2006)

- a. Does not have mesentery
- b. Has taenia coli
- c. Develops from midgut
- d. Supplied by appendicular branch of ileocolic artery

62. The commonest anatomical position of appendix is:

(Karnataka 2013, DNB 2012, MHPGMCET 2007, 2001)

- a. Retrocaecal
- b. Pelvic
- c. Paracecal
- d. Preileal

63. The fold of Treves is:

(MAHE 2005)

- a. The fold of mucous membrane projecting into the lumen of the rectum
- b. The ilio-appendicular fold of peritoneum
- c. The fold of mucous membrane around the papilla of water
- d. The fold of peritoneum over the inferior mesenteric vein

MISCELLANEOUS

64. Malone procedure is used in:

(KGMC 2011)

- a. Anorectal incontinence
- b. Urinary incontinence
- c. Neurogenic bladder
- d. GERD

65. Which of the following present as acute abdomen?

(Karnataka 89)

- a. Acute intermittent porphyria
- b. Tabes
- c. Pneumonitis of lower lobe
- d. All

EXPLANATIONS

ACUTE APPENDICITIS

1. Ans. a. Luminal obstruction (Ref: Sabiston 19/e p1279-1282; Schwartz 10/e p1243-1251, 9/e p1074-1078; Bailey 26/e p1201-1210, 25/e p1205-1212; Shackelford 7/e p2019-2023)

ACUTE APPENDICITIS

- Acute appendicitis is the MC general surgical emergency^Q
- Worldwide, perforated appendicitis is the leading general surgical cause of death^Q.

Pathophysiology

- Obstruction of the lumen^Q is believed to be the major cause of acute appendicitis^Q.
- Obstruction of the lumen may be caused by inspissated stool (fecolith^Q or appendicolith^Q), lymphoid hyperplasia^Q, vegetable matter or seeds^Q, parasites, or a neoplasm^Q.

- Obstruction of the appendiceal lumen contributes to bacterial overgrowth and continued secretion of mucus leads to intraluminal distention and increased wall pressure. Luminal distention produces the visceral pain sensation experienced by the patient as periumbilical pain.

- Subsequent impairment of lymphatic and venous drainage leads to mucosal ischemia.

Bacteriology

- MC bacteria isolated in perforated appendicitis: *Bacteroides fragilis* (80%) > *E. coli* (77%).

Clinical Features

- Diagnosis can be made primarily on the basis of the history and physical examination in most cases.
- Typical presentation: Periumbilical pain followed by anorexia and nausea.

- The pain then localizes to the right lower quadrant as the inflammatory process progresses to involve the parietal peritoneum overlying the appendix.
- This classic pattern of migratory pain is the most reliable symptom of acute appendicitis.
- A bout of vomiting may occur. Fever ensues, followed by the development of leukocytosis.
- Occasional patients have urinary symptoms or microscopic hematuria

- Tenderness is directly over the appendix, at McBurney's point.
- Rectal and pelvic examinations are most likely to be negative (Tenderness on examination in pelvic appendix)

Dunphy's sign ^Q	• Pain on coughing ^Q
Rovsing's sign ^Q	• Pain in the right lower quadrant during palpation of the left lower quadrant ^Q
Obturator sign ^Q	• Pain on internal rotation of the hip ^Q • Suggestive of pelvic appendix ^Q
Iliopsoas sign ^Q	• Pain on extension of the right hip ^Q • Suggestive of retrocecal appendix ^Q

Diagnosis

Laboratory Studies

- WBC count is elevated, with more than 75% neutrophils in most patients^Q.
- Normal WBC count and differential is found in 10% of patients with acute appendicitis^Q.
- High WBC count (>20,000/mL) suggests complicated appendicitis with gangrene or perforation^Q.
- Microscopic hematuria is common in appendicitis (gross hematuria may indicate the presence of a kidney stone)^Q

Ultrasound

- USG has a sensitivity of 85% and a specificity >90% for the diagnosis of acute appendicitis in patients of abdominal pain.
- Characteristic findings: Appendix ≥ 7 mm diameter, a thick-walled, noncompressible luminal structure seen in cross section (target lesion), or the presence of an appendicolith^Q.
- Commonly used in children and pregnant patients^Q with equivocal clinical findings suggestive of acute appendicitis.

Plain X-ray

- A calcified appendicolith is visible in only 10–15% of patients with acute appendicitis.
- Failure of the appendix to fill during a barium enema has been associated with appendicitis^Q (this finding lacks sensitivity and specificity because up to 20% of normal appendices do not fill).

CT Scan

- **CT scan:** Sensitivity of 90% and a specificity of 80-90% for the diagnosis of **acute appendicitis** in patients with abdominal pain^Q.
- **Classic findings on CT:** Distended appendix > 7 mm in diameter and **circumferential wall thickening and enhancement** (appearance of a halo or target)^Q
- **CT detects appendicoliths** in 50% of patients with appendicitis.
- **Most valuable for older patients** and in patients with atypical symptoms

Treatment

- Most patients are managed by prompt **appendectomy**^Q.

2. Ans. a. TLC and DLC, c. USG

3. Ans. a. Clinical examination, b. USG, c. CT scan, d. Blood counts

4. Ans. c. Early antibiotics prevent rupture (Ref: Sabiston 19/e p1286; Schwartz 10/e p1250-1251, 9/e p1078-1080; Shackelford 7/e p2027)

Early antibiotic doesn't prevent rupture, most patients are managed by **prompt surgical removal of the appendix**.

APPENDICULAR PERFORATION

- **Immediate appendectomy** has long been the **recommended treatment** for acute appendicitis because of the presumed **risk of progression to rupture**^Q.
- The overall rate of perforated appendicitis is 25.8%.
- **Children <5 years^Q of age and patients > 65 years^Q of age** have the **highest rates of perforation** (45 and 51%, respectively).

Risk Factors for Appendicular Perforation (Fecolith DIE in Pelvic Surgery)

- | | |
|---|--|
| <ul style="list-style-type: none"> • Fecolith^Q • Diabetes mellitus^Q • Immunosuppression^Q | <ul style="list-style-type: none"> • Extremes of ages^Q • Pelvic appendix^Q • Previous abdominal surgery^Q |
|---|--|

- It has been suggested that **delays in presentation** are **responsible for the majority of perforated appendices**^Q.
- **Appendiceal rupture** occurs **most frequently distal to the point of luminal obstruction along the antimesenteric border** of the appendix^Q.

- **Rupture should be suspected** in the presence of **fever with a temperature of > 39°C (102°F)** and a **WBC count of > 18,000 cells/mm³**.
- **MC bacteria isolated in perforated appendicitis:** *Bacteroides fragilis* (80%) > *E. coli* (77%)^Q.

5. Ans. c. Pelvic

6. Ans. b. Extension (Ref: Sabiston 19/e p1280; Schwartz 9/e p1076-1077; Bailey 26/e p1203, 25/e p1208-1210; Shackelford 7/e p2020)

7. Ans. a. Pain

8. Ans. a. Appendectomy

9. Ans. c. Bastedo sign (Ref: www.medilexicon.com)

Bastedo sign

- An **obsolete sign in chronic appendicitis**^Q
- **Pain and tenderness in right iliac fossa on inflation of the colon with air**^Q

10. Ans. b. Tension gangrene due to the accumulating secretions

11. Ans. a. Faecolith, b. Worms of ileo-caecal region

12. Ans. d. Purgation (Ref: Sabiston 19/e p1284-1286; Schwartz 10/e p1243-1251, 9/e p1084; Bailey 26/e p1206-1212, 25/e p1211-1215; Shackelford 7/e p2022-2024)

MANAGEMENT OF ACUTE APPENDICITIS

- Most patients are managed by **prompt surgical removal of the appendix**^Q.
- A **brief period of resuscitation**^Q is usually sufficient to ensure the safe induction of general anesthesia.
- **Preoperative antibiotics**^Q cover aerobic and anaerobic colonic flora.
- **Single preoperative dose of antibiotics in nonperforated appendicitis reduces postoperative wound infections and intra-abdominal abscess formation**^Q.
- **Perforated or gangrenous appendicitis:** Continue **postoperative IV antibiotics until the patient is afebrile**^Q.

- **Appendectomies** are performed **laparoscopically**, particularly in **fertile women, obese patients**, and cases of **diagnostic uncertainty**^Q.
- **Open appendectomy** is usually performed through a **transverse right lower quadrant incision** (Davis-Rockey) or an **oblique incision** (McArthur-McBurney)^Q.
- For **uncomplicated cases**, a **transverse, muscle-splitting incision** lateral to the rectus abdominis muscle **over McBurney's point** is preferred^Q.

13. Ans. a. E. coli

14. Ans. a. When appendicular perforation occurs early (within 24 hours) (Ref: Bailey 26/e p1212, 25/e p1216)

- In late stages, greater omentum and small bowel becomes adherent to inflamed appendix, walling off the spread of peritoneal contamination^Q.

15. Ans. a. Rovsing's

16. Ans. None (Ref: Harrison 16/e p84)

- Harrison 14 says "Narcotics or analgesics should be withheld until a definitive diagnosis or a definitive plan has been formulated, because these agents often make it more difficult to secure and to interpret the history and physical findings."
- Harrison 16 says "Narcotics or analgesics should not be withheld until a definitive diagnosis or a definitive plan has been formulated; obfuscation of diagnosis by adequate analgesia is unlikely^Q."

17. Ans. d. Acute appendicitis (Ref: Sabiston 19/e p1147)

Abdominal Examination Signs		
Sign	Description	Diagnosis
Aaron sign	Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney's point ^Q	Acute appendicitis ^Q
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg's sign	Transient abdominal wall rebound tenderness ^Q	Peritoneal inflammation
Carnett's sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier's sign	Palpable gallbladder in presence of painless jaundice ^Q	Periampullary tumor ^Q
Cruveilhier sign	Varicose veins at umbilicus (caput medusae) ^Q	Portal hypertension ^Q
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill's sign	Abdominal wall mass that does not cross midline and remains palpable when rectus contracted	Rectus muscle hematomas
Mannkopf's sign	Increased pulse when painful abdomen palpated	Absent if malingering
Ransohoff sign	Yellow discoloration of umbilical region	Ruptured CBD ^Q
Ten Horn sign	Pain caused by gentle traction of right testicle ^Q	Acute appendicitis ^Q

18. Ans. a. Acute appendicitis

19. Ans. c. Fever > 42 degree Celsius

20. Ans. b. Iliopsoas sign

21. Ans. b. Vomiting precedes abdominal pain (Ref: Sabiston 19/e p1280; Bailey 25/e p1208)

- Typical presentation: Periumbilical pain followed by anorexia and nausea^Q.
- Localized pain is the most important symptom^Q
- Perforation occurs in 80% of cases < 5-years
- Approximately 60% perforation occurs within 48 hours

22. Ans. d. Leucopenia, e. Shift to right (Ref: Schwartz 9/e p1080; Bailey 26/e p1207, 25/e p1211)

Alvarado (MANTRELS) scores		
	Manifestations	Score
Symptoms	• Migratory RIF pain	1
	• Anorexia	1
	• Nausea and vomiting	1
Signs	• Tenderness (RIF)	2
	• Rebound tenderness	1
	• Elevated temperature	1
Laboratory	• Leucocytosis	2
	• Shift to left	1
	Total	10

Scores	Prediction
9–10	Appendicitis is certain
7–8	High likelihood of appendicitis
5–6	Equivocal
1–4	Appendicitis can be ruled out

- CT scanning is appropriate for making diagnosis in patients with Alvarado scores of 5 and 6 (in equivocal cases) ^Q.

23. Ans. a. Blockage of lumen 24. Ans. a. Peritoneum 25. Ans. c. Cullen's sign
 26. Ans. d. Acute appendicitis 27. Ans. c. Acute appendicitis
 28. Ans. d. *Yersinia enterocolitica* (Ref: Sabiston 19/e p1105)

ACUTE MESENTERIC LYMPHADENITIS

- Syndrome of **acute right lower quadrant abdominal pain** associated with **mesenteric lymph node enlargement** and a **normal appendix** ^Q.
- Diagnosis is made upon exploration** of the abdomen of a **patient suspected of having acute appendicitis** at which time a **normal appendix and enlarged mesenteric lymph nodes** ^Q are discovered.
- Occurs **most commonly** in **children and young adults** ^Q
- Equal frequency in males and females.
- Yersinia enterocolitica* has been associated with this syndrome in children ^Q.

29. Ans. b. Anorexia 30. Ans. b. Mesenteric lymphadenopathy 31. Ans. b. Ultrasound

APPENDICITIS IN PREGNANCY

32. Ans. c. Conservative management by antibiotics should be tried (Ref: Sabiston 19/e p1283; Schwartz 10/e p1256-1257, 9/e p1082-1083; Bailey 25/e p1209; Shackelford 7/e p2021-2022)

Surgery should be performed during pregnancy when appendicitis is suspected, just as it would be in a nonpregnant woman.

APPENDICITIS IN PREGNANCY

- Appendicitis is the **MC nonobstetric surgical disease of the abdomen during pregnancy** ^Q.
- Risk during pregnancy is the **same** as it is in **nonpregnant women** of the same age
- Incidence is 1 in 2000 pregnancies.
- Can occur in any trimester, with a **slight increase** ^Q in frequency during the **2nd trimester**.
- Perforation is more common** in the **3rd trimester** ^Q
- Fetal mortality** can rise up to **35–50%** in cases of **perforation** ^Q.

Clinical Features

- Diagnosis may be difficult because symptoms of **nausea, vomiting, and anorexia**, as well as elevated **WBC count**, are common during pregnancy ^Q.
- Location of tenderness varies with gestation** ^Q.
- After the fifth month of gestation, the appendix is shifted superiorly above the iliac crest and the appendiceal tip is rotated medially into the right upper quadrant by the gravid uterus.

Diagnosis

- Ultrasound** ^Q is helpful for establishing the **diagnosis and location** of the inflamed appendix.

Treatment

- Early appendectomy** ^Q is the appropriate therapy in suspected appendicitis **during all stages** of pregnancy.
- Laparoscopic appendectomy** is **safe** ^Q

33. Ans. b. Ultrasound abdomen
 34. Ans. a. Alder's test (Ref: www.ncbi.nlm.nih.gov/.../PMC3398111)

ALDER'S TEST

- Localizing the area of maximal abdominal tenderness and maintaining constant pressure** on that point while the **patient is being turned to left** ^Q.
- If the **pain is constant**, pain is of **extra-uterine origin**; if **pain disappears** it is more likely to be **uterine or tubal origin** ^Q.
- This is a **very useful and important clinical test** which may be **employed in all cases** of an **acute abdomen in pregnancy** ^Q.

OCHSNER-SHERREN REGIME

35. Ans. c. Appendicular mass (Ref: Sabiston 19/e p1286; Schwartz 9/e p1086-1087; Bailey 26/e p1211, 25/e p1215-1216)

MANAGEMENT OF APPENDICULAR MASS

- If an **appendix mass** is present and the **condition of the patient** is **satisfactory**, the standard treatment is the **conservative Ochsner-Sherren regimen**^Q.
- This strategy is based on the premise that **inflammatory process** is **already localized** and that **inadvertent surgery** is **difficult**^Q and **may be dangerous**. It may be impossible to find the appendix and, a **fecal fistula** may form.
- For these reasons, it is wise to observe a non-operative programme but to be prepared to operate should clinical deterioration occur.

- **CECT abdomen** should be performed and **antibiotic therapy** should be given^Q.
- An **abscess**, if present, should be **drained radiologically**^Q.

- **Temperature** and **pulse rate** should be recorded **4-hourly** and a **fluid balance** record maintained.
- **Clinical deterioration** or **evidence of peritonitis** is an **indication for early laparotomy**^Q.

- **Clinical improvement** is usually evident **within 24-48 hours**^Q.
- **Failure of the mass to resolve** should raise **suspicion of a carcinoma** or **Crohn's disease**^Q.

- Using this regimen, approximately **90% of cases resolve without incident**.
- The **great majority of patients will not develop recurrence**, and it is **no longer considered advisable to remove the appendix** after an interval of 6-8 weeks^Q.

Criteria for stopping conservative treatment of an appendix mass

- A **rising pulse rate**^Q
- **Increasing or spreading abdominal pain**^Q
- **Increasing size of the mass**^Q

36. Ans. b. Appendicular mass

37. Ans. c. Ochsner-Sherren regimen

38. Ans. d. Operation is to be done immediately

39. Ans. c. Appendicular lump

40. Ans. c. Ochsner-Sherren regimen

NEOPLASM OF APPENDIX

41. Ans. b. Adenocarcinoma (Ref: Sabiston 19/e p1289-1291; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213-1214, 25/e p1217-1218; Shackelford 7/e p2028)

- Sabiston says "Although it was **previously believed** that **carcinoid tumors** were the **most common appendiceal neoplasms**, analysis of the Surveillance, Epidemiology, and End Results (SEER) database indicates that **mucinous tumors of the appendix** are **more common**."
- Schwartz says "Data from the **SEER program** identified **mucinous adenocarcinoma** as the **most frequent histologic diagnosis** (38% of total reported cases), **followed by adenocarcinoma** (26%), **carcinoid** (17%), **goblet cell carcinoma** (15%), and **signet-ring cell carcinoma** (4%). Five-year survival for appendiceal malignancies varies by tumor type. Patients with **carcinoid tumors** have the **best 5-year survival** (83%), whereas those with **signet-ring cell cancers** have the **lowest** (18%)."

- **MC neoplasm of appendix (MAC):** Mucinous adenocarcinoma^Q (38%) > Adenocarcinoma (26%) > Carcinoid (17%).
- **MC malignant neoplasms of the small bowel:** Carcinoid tumors^Q > adenocarcinomas > malignant GISTs > lymphomas.

42. Ans. c. Right hemicolectomy (Ref: Sabiston 19/e p1289-1291; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213, 25/e p1217; Shackelford 7/e p2028)

APPENDICEAL CARCINOID

- **Appearance:** Firm, yellow, bulbar mass in the appendix^Q
- Majority of carcinoids are **located in the tip**^Q of the appendix.
- **Mean tumor size** for carcinoids is **2.5 cm**^Q.
- Carcinoid tumors **usually present with localized disease** (64%)^Q.

Clinical Features

- **Carcinoid syndrome** is **rarely associated**^Q with appendiceal carcinoid unless widespread metastases are present.
- **Symptoms attributable directly to the carcinoid are rare**^Q, although the tumor can occasionally obstruct the appendiceal lumen much like a fecalith and result in acute appendicitis
- **Malignant potential** is **related to size**, with **tumors < 1 cm rarely resulting in extension outside of the appendix**^Q or adjacent to the mass.

Treatment of Appendiceal Carcinoid	
Size	Treatment option
Up to 1 cm	• Appendectomy ^a
> 1–2 cm	• Appendectomy if located at tip or mid-appendix • Right hemicolectomy if: – Located at base ^a – Invading mesoappendix ^a – LN involvement ^a
> 2 cm	• Right hemicolectomy ^a

Prognosis

- Patients with carcinoid tumors have the best 5-year survival (83%)^Q.

43. Ans. a. Right hemicolectomy

44. Ans. a. Benign tumour, b. Low grade malignancy, c. Retention cyst (Ref: Sabiston 19/e p1289-1290; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213, 25/e p1217-1218; Shackelford 7/e p2028)

MUCOCELE OF APPENDIX

- A mucocele of the appendix is an **obstructive dilatation** by **intraluminal accumulation of mucoid material**^Q.
- Caused by one of four processes: **retention cysts, mucosal hyperplasia, cystadenomas, and cystadenocarcinomas**^Q.
- **Intact mucoceles < 2 cm are almost always benign**^Q.
- Larger mucoceles are more likely to be neoplastic.

Clinical Features

- Clinical presentation is **nonspecific** (an **incidental finding at operation**)
- An **intact mucocele** presents **no future risk** for the patient; however, the **opposite is true** if the **mucocele has ruptured** and **epithelial cells have escaped into the peritoneal cavity**^Q.

Treatment

- Every effort is made to **keep the mucocele intact during extraction**, including **placing the specimen in a bag** or **converting a laparoscopic procedure to an open procedure**^Q, if necessary.
- Presence of a mucocele does not mandate performance of a **right hemicolectomy**^Q.

- Surgery include: **Appendectomy + Wide resection of the mesoappendix** to include all the appendiceal lymph nodes + **Collection and cytologic examination of all intraperitoneal mucus + Inspection of the base of the appendix**^Q.

- **Right hemicolectomy is reserved** for patients with a **positive margin at the base of the appendix** or **positive periappendiceal lymph nodes**^Q.

45. Ans. a. Right hemicolectomy

46. Ans. c. Constitute 50% of GI carcinoid (Ref: Harrison 18/e p3058)

Carcinoid Tumor Location, Frequency of Metastases, and Association with the Carcinoid Syndrome			
	Location (% of Total)	Incidence of Metastases	Incidence of Carcinoid Syndrome
Foregut			
• Esophagus	< 0.1	—	—
• Stomach ^a	4.6 ^a	10	9.5
• Duodenum	2.0	—	3.4
• Pancreas ^a	0.7	71.9 ^a	20 ^a
• Gallbladder	0.3	17.8	5
• Bronchus ^a , lung, trachea	27.9 ^a	5.7	13
Midgut			
• Jejunum	1.8	(58.4 ^a in jejunum and ileum)	9
• Ileum ^a	14.9 ^a	—	9
• Meckel's diverticulum	0.5	—	13
• Appendix ^a	4.8 ^a	38.8	<1
• Colon ^a	8.6 ^a	51	5
• Liver	0.4	32	—
• Ovary	1.0	32	50 ^a
• Testis	< 0.1	—	50 ^a
Hindgut			
• Rectum ^a	13.6 ^a	3.9	—

47. Ans. d. Mucinous carcinoma

48. Ans. a. Right hemicolectomy (Ref: Sabiston 19/e p1290)

APPENDICEAL ADENOCARCINOMA

- Appendiceal adenocarcinomas found in < 1% of appendectomy specimens.
- Most are **discovered incidentally**^Q.
- **Typical patient** is older and the **duration of symptoms** is usually longer.
- **Mucinous adenocarcinoma cell type** is **most common** and has a **better prognosis**^Q after resection than the colon or signet ring cell type, with 5-year survival rates approaching 50%.
- **Right hemicolectomy** is **recommended**^Q.

APPENDECTOMY

49. Ans. a. McArthur (Ref: Bailey 26/e p1207-1209, 25/e p1212-1213)

CONVENTIONAL APPENDECTOMY

- When the preoperative diagnosis is considered reasonably certain, the incision that is widely used for appendectomy is the so called **gridiron incision** (gridiron: a frame of cross-beams to support a ship during repairs)^Q.

- The **gridiron incision** (described first by McArthur^Q) is made at right angles to a line joining the anterior superior iliac spine to the umbilicus, its centre being along the line at McBurney's point^Q.

- If **better access** is required, it is possible to convert the gridiron to a Rutherford Morison incision^Q by cutting the internal oblique and transversus muscles in the line of the incision.

- In recent years, a **transverse skin crease (Lanz^Q) incision** has become **more popular**, as the **exposure is better** and **extension**, when needed, is **easier**.
- The **incision**, appropriate in length to the size and obesity of the patient, is made approximately **2 cm below the umbilicus centred on the mid-clavicular-midinguinal line**.
- It is a **muscle splitting incision**^Q along the **direction of fibers**.

- When the **diagnosis is in doubt**, particularly in the **presence of intestinal obstruction**, a **lower midline abdominal incision**^Q is to be **preferred** over a right lower paramedian incision.

- **Rutherford Morison's incision** is **useful** if the appendix is **para or retrocaecal** and **fixed**^Q.
- It is **essentially an oblique muscle-cutting incision** with its **lower end over McBurney's point** and **extending obliquely upwards and laterally** as necessary. All layers are divided in the line of the incision^Q.

50. Ans. c. 3 mm (Ref: Maingot 11/e p602)

No matter how the appendix is divided, the **residual appendiceal stump should be no longer than 3 mm** to minimize the possibility of **stump appendicitis** in the future.

STUMP APPENDICITIS

- Appendicitis in the remaining appendiceal stump after appendectomy
- The residual appendiceal **stump should not be more than 3mm**^Q to minimize the possibility of stump appendicitis.

51. Ans. b. No burying of stump (Ref: Sabiston 19/e p1284-1286; Schwartz 10/e p1251-1256, 9/e p1084; Bailey 26/e p1207-1209, 25/e p1212-1213; Shackelford 7/e p2023-2024)

STEPS OF APPENDECTOMY

- Cecum is identified by the **presence of taenia coli**, a **turgid appendix** may be **felt at the base** of the cecum^Q.
- **Base of the mesoappendix** is **clamped in artery forceps**, **divided and ligated**^Q.
- **Appendix** is **crushed near its junction with the cecum** in artery forceps, which is removed and reapplied just distal to the crushed portion^Q.
- An **absorbable ligature** is **tied around the crushed portion** close to the cecum^Q.
- **Appendix** is **amputated** between the artery forceps and the ligature.
- An **absorbable purse-string** or **'Z' suture** may then be **inserted into the cecum** about 1.25 cm from the base^Q.
- **Stump** of the appendix is **invaginated while the purse-string** or **'Z' suture** is **tied**, thus burying the appendix stump^Q.
- Many surgeons believe **invagination** of the appendiceal stump is **unnecessary**^Q.

Methods to be adopted in special circumstances	
Edematous and inflamed cecal wall	<ul style="list-style-type: none"> • Purse string suture is not applied^Q • Stump is not invaginated^Q
Inflamed base of appendix	<ul style="list-style-type: none"> • Base is not crushed for the fear of spread of infection by way of lymphatics and blood stream^Q. • Base is ligated close to the cecal wall^Q, after which the appendix is amputated and the stump invaginated.
Gangrenous base of appendix	<ul style="list-style-type: none"> • Neither crushing nor ligation^Q • Two stitches are placed through the cecal wall close to the base of the gangrenous appendix, which is amputated flush with the cecal wall^Q, after which these stitches are tied. Further closure is effected by means of a second layer of interrupted seromuscular sutures^Q.

52. Ans. b. Iliohypogastric (Ref: Bailey 25/e p1213)

- Right inguinal hernia is more common following a gridiron incision for appendectomy, and is due to injury to the iliohypogastric nerve^Q.
- IH → IH (IlioHypogastric nerve → Inguinal Hernia)

53. Ans. d. The incision can be extended upwards or downwards (Ref: Bailey 26/e p1208, 25/e p1213)

- In McBurney's incision, incision is extended upwards and laterally, not downwards.

54. Ans. b. Cutting the muscles laterally

55. Ans. d. Lanz

56. Ans. b. There is stenosis/narrowing of the sigmoid colon (Ref: Sabiston 19/e p1271)

- Unrelieved obstruction of the tube distal to fistula is a cause of persistence of fistula.

57. Ans. b. Sterility

58. Ans. c. Undiagnosed ileo-cecal disease (Ref: Bailey 26/e p1212, 25/e p1216-1217)

- Leakage from the appendicular stump occurs rarely, but may follow if the encircling stitch has been put in too deeply or if the cecal wall was involved by edema or inflammation. Occasionally, a fistula may result following appendectomy in Crohn's disease.

Complications of Appendectomy	
<ul style="list-style-type: none"> • Wound infection: MC postoperative complication^Q (in 5-10% of all patients). • Intra-abdominal abscess^Q • Ileus^Q • Respiratory complications (rare)^Q • Venous thrombosis and embolism • Portal pyaemia (pylephlebitis) • Adhesive intestinal obstruction: <ul style="list-style-type: none"> – MC late complication of appendectomy^Q. – At operation, a single band adhesion is often found to be responsible^Q. 	<ul style="list-style-type: none"> • Fecal fistula^Q <ul style="list-style-type: none"> – Leakage from the appendicular stump occurs rarely, but may follow if the encircling stitch has been put in too deeply or if the cecal wall was involved by edema or inflammation^Q. – Occasionally, a fistula may result following appendicectomy in Crohn's disease^Q. – Conservative management with low-residue enteral nutrition will usually result in closure^Q.

59. Ans. b. Iliohypogastric nerve (Ref: Love & Bailey 24/e p1217)

- "Right inguinal hernia is more common following a grid iron (MC Burney's) incision for appendicectomy and is due to injury to the iliohypogastric nerve"

APPENDIX ANATOMY AND PHYSIOLOGY

60. Ans. b. Supplies terminal ileum also (Ref: Sabiston 19/e p1279)

ANATOMY OF APPENDIX

- Appendix, ileum, and ascending colon are all derived from the midgut^Q.
- Appendiceal artery (end artery), a branch of the ileocolic artery, supplies the appendix^Q.
- Length: 2-20 cm (average length is 9 cm in adults)^Q.
- Base of the appendix is located at the convergence of the taeniae along the inferior aspect of the cecum^Q
- MC location: Retrocecal^Q

61. Ans. c. Develops from midgut, d. Supplied by appendicular branch of ileocolic artery
 62. Ans. a. Retrocaecal
 63. Ans. b. The ilio-appendicular fold of peritoneum (Ref: Sabiston 19/e p1294-1295)

- Jackson Membrane^Q: Adhesion from the right abdominal wall to the anterior taenia of the ascending colon.
- Gerlach valves^Q: A mucosal fold covering the appendiceal orifice.
- Fold of Treves^Q: Inferior ileocecal fold (does not contain any vessel, referred as the bloodless fold of Treves)

MISCELLANEOUS

64. Ans. a. Anorectal incontinence (Ref: Bailey 25/e p1341; Shackelford 7/e p2292)

APPENDICOSTOMY

- Use in urologic reconstruction as an **appedicovesicostomy** in patients requiring chronic catheterization for bladder emptying (Mitrofanoff procedure)^Q
- An **appendicolostomy** for patients in whom the bladder is absent or too small is created by implanting the appendix under the taeniae of a detubularized patch of cecum or sigmoid colon.
- **Conduit for decompression** after colon surgery or for the **chronic administration** of medications or **enema** (Malone Procedure)^Q

65. Ans. d. All (Ref: Bailey 26/e p1205, 25/e p1211)

Rare differential diagnoses of Acute Appendicitis	
<ul style="list-style-type: none"> • Preherpetic pain^Q of the right 10th and 11th dorsal nerves • Tabetic crises (Tabes^Q) • Acute intermittent porphyria^Q 	<ul style="list-style-type: none"> • Diabetes mellitus^Q • Typhlitis or leukemic ileocecal syndrome^Q

Rectum and Anal Canal

MULTIPLE CHOICE QUESTIONS

VILLOUS ADENOMA

- Villous polyp of rectum manifest:** (All India 89)
 - Bleeding PR
 - Mucus diarrhea with hypokalemia
 - Prolapse rectum
 - Obstruction
- In villous papillomas of the rectum which is lost:** (DNB 2007, 2003, TN 89)

a. Na ⁺	b. Mg ²⁺
c. K ⁺	d. All
- The best surgical management for villous adenoma of the rectum is:** (PGI 81, APPG 88)
 - Local resection of lesion
 - Repeated sigmoidoscopy
 - Abdomino perineal resection
 - Electrolyte infusion and chemotherapy
- Rectal adenoma is associated with:** (JIPMER 2003)

a. Familial polyposis coli	b. Hypokalemia
c. Intussusception	d. Hemorrhoids
- Regarding villous adenoma all are true except:** (WBPG 2014)
 - Dysentery
 - Watery diarrhea
 - Hypokalemia
 - Constipation

RECTAL POLYP

- Rectal polyps usually present with:** (SGPGI 2005, UPPG 97)
 - Obstruction
 - Perforation
 - Bleeding
 - Malignant change
- A toddler has few drops of blood coming out of rectum. Probable diagnosis is:** (AIIMS May 2013, AIIMS May 2012)
 - Juvenile rectal polyp
 - Adenomatous polyposis coli
 - Rectal ulcer
 - Piles
- Most common cause of fresh bleeding per rectum in a 5-years old child is:** (WBPG 2012, AIIMS June 93)

a. Volvulus	b. Trauma
c. Worm infestation	d. Rectal polyp

CARCINOMA RECTUM

- All are true about TME for CA rectum except:** (AIIMS GIS Dec 2009)
 - Decreases local recurrence
 - Decreases incidence of impotence
 - Decreases incidence of bladder dysfunction
 - Decreases survival
- Local excision in CA rectum is done in all except:** (AIIMS GIS Dec 2009)
 - Within 6 cm of anal verge
 - Lesion < 4 cm
 - Involvement of < 40% circumference
 - T1 and T2 cancer with or without lymph node involvement
- In CA rectum, preoperatively:** (AIIMS GIS Dec 2009)
 - Only RT is given
 - Only chemotherapy is given
 - Chemoradiation is given
 - Chemoradiation is given postoperatively only
- In rectal carcinoma, distal margin should be at least:** (PGI SS June 2001)

a. 2 cm	b. 3 cm
c. 4 cm	d. 5 cm
- True about surgical treatment of rectal cancer:**
 - Irrigation of divided bowel ends with cytotoxic solution may reduce local recurrence (PGI SS Dec 2009)
 - Intramural spread is commonly > 4 cm
 - Minimum of 5 cm distal resection margin is required
 - Mesorectum is devoid of lymph nodes
- Dukes A stage of rectal carcinoma is managed by:** (DNB 2008)
 - Surgical resection only
 - Surgical resection + selective adjuvant chemotherapy
 - Surgical resection + routine adjuvant chemotherapy
 - Chemotherapy primarily
- All are true about rectal cancer except:** (JIPMER GIS 2011)
 - Most common symptom is hematochezia
 - Precise location of tumor is done with rigid proctosigmoidoscopy
 - Dissection lateral to endopelvic fascia investing the mesorectum causes local recurrence
 - Radiation dose is 60 Gray
- False about indications of local resection in CA rectum:** (AIIMS GIS 2003)
 - T2N0, T1N1
 - < 10 cm from anal verge
 - < 4 cm or < 40% of circumference involved
 - Well differentiated with no LN involvement

17. **Best treatment for a 4 cm moderate grade rectal cancer at the junction of lower and mid one thirds, with less than one third circumference of the rectum being involved?**
(MHSSMCET 2008, 2006)
 - a. Radiotherapy
 - b. Anterior resection
 - c. Transanal resection
 - d. Abdomino-perineal resection
18. **Distal margins of clearance required for treatment of CA rectum is ____ and lateral and proximal margins ____:**
(MHSSMCET 2010)
 - a. 2 cm and 5 cm
 - b. 3 cm and 5 cm
 - c. 5 cm and 2 cm
 - d. 5 cm and 3 cm
19. **A patient with carcinoma of rectum which is 5 cm from anal verge, which procedure you will prefer to perform:**
(MHSSMCET 2005)
 - a. Anterior resection
 - b. Abdominoperineal resection
 - c. Hartman's procedure
 - d. Defunctioning colostomy
20. **Which of the following is the investigation of choice for assessment of depth of penetration and perirectal nodes in rectal cancer?**
(AIIMS Nov 2004)
 - a. Transrectal ultrasound
 - b. CT scan pelvis
 - c. MRI Scan
 - d. Double contrast barium enema
21. **Vimal, a 70-years old male presents with a history of lower GI bleed for last 6 months. Sigmoido-scopic examination shows a mass, of 4 cm about 3.5 cm above the anal verge. The treatment of choice is:**
(AIIMS June 2001)
 - a. Colostomy
 - b. Anterior resection
 - c. Abdominoperineal resection
 - d. Defunctioning anastomosis
22. **A patient comes with rectal carcinoma situated 6 cm above dentate line with no nodal metastasis. Treatment of choice will be:**
(AIIMS Nov 97)
 - a. Anterior resection
 - b. APR
 - c. Radiotherapy
 - d. Hartman's procedure
23. **For a rectal carcinoma at 5 cm from the anal verge, the best acceptable operation is:**
(All India 2004)
 - a. Anterior resection
 - b. Abdominoperineal resection
 - c. Posterior resection
 - d. APR done in lesion of upper zone
24. **True about rectal cancer:**
(PGI June 2005)
 - a. Most common type is adenocarcinoma
 - b. Surgery is the treatment of choice
 - c. Surgical treatment indicated in spite of hepatic metastasis
 - d. APR done in lesion of upper zone
25. **Commonest presentation of CA rectum is:**
(JIMPER 2012, DPG 95)
 - a. Diarrhea
 - b. Constipation
 - c. Bleeding P/R
 - d. Feeling of incomplete defecation
26. **Sphincter saving surgery for rectal malignancy is not done in:**
(PGI Dec 2001)
 - a. Age over 50 years
 - b. Lymph node involvement
 - c. Infiltration of lamina propria
 - d. More than 4 cm from anal verge
 - e. High grade tumor
27. **Abdomino-perineal resection is done in colorectal carcinoma on the basis of:**
(PGI June 2002)
 - a. Age of patient
 - b. Distance from anal-verge
 - c. Fixity of tumor
 - d. Hepatic metastasis
 - e. Extent of tumor
28. **In which case anterior resection is the method of treatment?**
(AIIMS Feb 97)
 - a. CA sigmoid colon
 - b. CA rectum
 - c. CA colon
 - d. CA anal canal
29. **Prognosis for carcinoma rectum is best assessed by:**
(AIIMS 87, Karnataka 89)
 - a. Site of tumour
 - b. Histological grading
 - c. Size of tumors
 - d. Duration of the symptoms
30. **Best procedure in mid rectal carcinoma is:**
(AIIMS 92)
 - a. Abdomino perineal resection
 - b. Anterior resection
 - c. Perineal loop
 - d. Transverse colostomy
31. **Treatment of carcinoma rectum 5 cm from anal verge without nodal metastasis is:**
(Kerala 94)
 - a. Abdominoperineal resection
 - b. Radiotherapy
 - c. Endoscopic resection
 - d. Chemotherapy
32. **Which of the following is more aggressive rectal carcinoma?**
(MAHE 2006)
 - a. Adenocarcinoma
 - b. Secondary mucoid carcinoma
 - c. Signet ring carcinoma
 - d. Squamous cell carcinoma
33. **A punch biopsy shows carcinoma rectum with fixed mass and X-ray chest normal. Which of the following is least useful investigation?**
(IIPG 2008)
 - a. Rigid proctoscope
 - b. Barium enema
 - c. CT chest
 - d. MRI-abdomen and pelvis
34. **Ideal management in an old and frail patient presenting with a mass situated 15 cm away from anal orifice:**
(MCI March 2005)
 - a. Abdomino-perineal resection
 - b. Colonoscopic removal
 - c. Hartman's operation
 - d. Anterior resection
35. **Aim of surgery in carcinoma rectum is:**
(MCI March 2010)
 - a. Limited excision of the rectum
 - b. Sacrificing gastrointestinal continuity
 - c. Preserving the anal sphincter
 - d. Preserving mesorectum
36. **Anterior resection is contraindicated in the following:**
(PGI 90)
 - a. Age more than 60 years
 - b. Undifferentiated carcinoma
 - c. Melanin in liver
 - d. Cancer is less than 5 cm from anorectal margin
37. **Distal clearness in surgery for carcinoma rectum is:**
(All India 90)
 - a. 2 cm
 - b. 5 cm
 - c. 10 cm
 - d. 8 cm
38. **Which one of the following statements is false regarding carcinoma rectum?**
(APPG 2015)
 - a. Hartmann's operation is done in old debilitated patients
 - b. Per rectal examination can diagnose only 10% of cases
 - c. Early morning spurious diarrhea and tenesmus can occur
 - d. Growth confined to rectal wall is stage A of Modified Duke staging

HEMORRHOIDS

39. **Not true about hemorrhoids:** (AIIMS GIS May 2008)
 a. First degree- no prolapse
 b. Excision for externo-internal piles
 c. Third degree- no surgery
 d. Conservative treatment in first degree
40. **Hemorrhoids managed by manual reduction:** (AIIMS GIS May 2011)
 a. I degree
 b. II degree
 c. III degree
 d. IV degree
41. **Which of the following is not true about hemorrhoids?** (PGI SS June 2007)
 a. Pruritus is not common
 b. Can be palpated on DRE in absence of complications
 c. Band ligation is most commonly done office procedure
 d. Stapled hemorrhoidectomy causes less postoperative pain
42. **True about treatment of hemorrhoids:** (PGI Nov 2010)
 a. Band ligation
 b. 5% phenol in almond oil is used as sclerosant
 c. May be resolved by diet modification
 d. Hemorrhoidectomy is TOC
43. **External hemorrhoids below the dentate line are:**
 a. Painful (AIIMS May 2012, All India 2007, AIIMS Nov 2006)
 b. Ligation is done as management
 c. Skin tag is not seen in these cases
 d. May turn malignant
44. **Injection sclerotherapy is ideal for the following:** (All India 2004)
 a. External hemorrhoids
 b. Internal hemorrhoids
 c. Posterior resection
 d. Local resection
45. **Commonest complication following haemorrhoidectomy is:** (MHSSCET 2005, AIIMS 92)
 a. Hemorrhage
 b. Infection
 c. Fecal impaction
 d. Urinary retention
46. **Treatment of choice in 2nd degree piles is:** (AIIMS 92)
 a. Cryosurgery
 b. Sclerotherapy
 c. Banding
 d. Surgery
47. **Treatment of primary piles is:** (Kerala 94)
 a. Surgery
 b. Sclerotherapy
 c. No treatment
 d. Analgesics
48. **Best investigation to diagnose piles is:** (Kerala 94)
 a. Proctosigmoidoscopy
 b. Barium enema
 c. Ultrasound
 d. Proctoscopy
49. **Five-day self subsiding pain is diagnostic of:** (APPG 97)
 a. Anal fissure
 b. Fistula-in-ano
 c. Thrombosed external hemorrhoids
 d. Thrombosed internal hemorrhoids
50. **The following are true of hemorrhoids except:** (JIPMER 2001)
 a. They are arteriolar dilatations
 b. They are common causes of painless bleeding
 c. They cannot be per rectally palpated
 d. They can be banded
51. **All of the following are true in management of hemorrhoids except:** (DPG 2009 March)
 a. Excisional surgery is cornerstone
 b. Fiber supplementation is effective
 c. Improvement in bowel function is helpful
 d. Ligation with rubber bands effective

52. **Most important disadvantage of cryosurgery for hemorrhoid is:** (DPG 2005)
 a. Pain
 b. Infection
 c. Profuse watery discharge
 d. Hemorrhage

53. **Which of the following is true about hemorrhoids?** (DNB 2008)
 a. More common with portal hypertension
 b. External hemorrhoids are proximal to dentate line
 c. Internal hemorrhoids bleed profusely and painless
 d. Internal hemorrhoids are covered by anoderm
54. **A patient with external hemorrhoids develops pain while passing stools. The nerve mediating this pain is:** (Recent Question 2015)
 a. Hypogastric nerve
 b. Sympathetic plexus
 c. Splanchnic visceral nerve
 d. Pudendal nerve

SOLITARY RECTAL ULCER SYNDROME

55. **All are true regarding solitary rectal ulcer syndrome:** (DNB 2002)
 a. Usually in anterior wall
 b. Associated with rectal prolapse
 c. Usually malignant
 d. Bowel training helps alot
56. **Colitis cystica profunda is seen in case of:** (AIIMS GIS Dec 2009)
 a. SRUS
 b. Rectal carcinoma
 c. Rectocele
 d. Fissure
57. **Most common site of SRUS:** (GB Pant 2011)
 a. Posterior, 7–10 cm from anal verge
 b. Anterior, 7–10 cm from anal verge
 c. Posterior, 2–3 cm from anal verge
 d. Anterior, 2–3 cm from anal verge
58. **True about solitary rectal ulcer syndrome is all/except:** (AIIMS May 2007)
 a. Increased muscle layer proliferation
 b. Crypt distortion
 c. Lamina propria infiltration with lymphocyte
 d. Subepithelial fibrosis
59. **Not true regarding solitary rectal ulcer:** (AIIMS Nov 97)
 a. 20% are multiple
 b. Recurrent rectal prolapsed is a cause
 c. Involves posterior wall
 d. Managed by digital reposition
60. **Treatment of solitary rectal ulcer are all except:** (PGI Dec 2007)
 a. Laxatives
 b. Rectopexy
 c. Banding
 d. Sclerosant injection
 e. Enema

RECTAL PROLAPSE

61. **A 40-years old male presented with reducible rectal prolapse with history of constipation from the last 10 years, redundant sigmoid with fecal matter, best form of management for this patient:** (ILBS 2011)
 a. Delorme procedure
 b. Anterior resection
 c. Rectopexy
 d. Mesh fixation
62. **Rectal prolapse is common in:** (WBPG 2014)
 a. 1–3 months
 b. 3–5 months
 c. 5–8 months
 d. 8–12 months
63. **Treatment of rectal prolapse in childhood is:** (AIIMS June 94)
 a. Lahaut's operation
 b. Incision of prolapsed mucosa
 c. Thiersch wiring
 d. Ripstein operation

64. Recurrent prolapse of the rectum in children is treated by:
a. Thiersch wiring (JIPMER 87, 88)
b. Digital reposition
c. Excision
d. Ripstein's operation

65. Delorme's procedure is used for:
(WBPB 2012, MHPGMCET 2007, MP 2002, SGPPI 2004)
a. Rectal prolapse b. Solitary rectal ulcer
c. Rectal bilharziasis d. Proctalgia fugax

66. A 30-years old male present with complete rectal prolapse. Which of the following procedure is associated with lowest risk of recurrence?
(All India 2012)
a. Delorme's procedure b. Thiersch procedure
c. Abdominal rectopexy d. Altmeir's procedure

67. A young male patient presents with complete rectal prolapse. The surgery of choice is:
(All India 2010)
a. Abdominal rectopexy b. Delorme's procedure
c. Anterior resection d. Goodsall's procedure

68. In old age for rectal prolapse palliative surgery in a patient unfit for surgery is:
(Recent Question 2013)
a. Delorme's procedure b. Well's procedure
c. Thiersch's operation d. Low anterior resection

ANORECTAL ABSCESS

69. Commonest type of anorectal abscess is:
(DNB 2012, AIIMS 85)
a. Ischio rectal
b. Submucous
c. Pelvi-rectal
d. Perianal

70. The increased incidence of infection in the ischiorectal fossa is due to:
(All India 89)
a. Absence of deep fascia b. Proximity to anus
c. Poor blood supply d. Presence of fibrofatty tissue

71. Most common cause of anorectal abscess is:
(MAHE 2007, 2008)
a. Inflammation of anal gland
b. Folliculitis
c. Inflammation of rectal mucosa
d. Rectum

FISTULA-IN-ANO

72. Most common anorectal fistula:
(AIIMS GIS Dec 2009)
a. Intersphincteric b. Transsphincteric
c. Suprasphincteric d. Extrasphincteric

73. An AIDS patient presents with fistula in ano. His CD₄ count is below 50. Treatment of choice is:
(Punjab 2008, MAHE 2001)
a. Seton b. Fistulectomy
c. Both d. Medical

74. Which type of malignancy is found in anorectal fistula?
(PGI June 2005)
a. Squamous cell carcinoma b. Transitional cell carcinoma
c. Adenocarcinoma d. Columnar carcinoma

75. True statement regarding 'Fistula in ano' is:
(All India 2001)
a. Posterior fistulae have straight tracks
b. High fistulae can be operated with no fear of incontinence
c. High and low divisions are made in relation to the pelvic floor
d. Intersphincteric is the most common type

76. The treatment of choice in fistula in ano:
(JIPMER 93)
a. Anal dilatation
b. Fissurotomy

c. Fistulectomy
d. Fistulotomy

77. High or low fistula in ano is termed according to its internal opening present with reference to:
(UPSC 2008)

a. Anal canal b. Dentate line
c. Anorectal ring d. Sacral promontory

78. Ideal investigation for fistula-in-ano is:
(Recent Question 2014, MCI March 2008)

a. Endoanal ultrasound b. MRI
c. Fistulography d. CT scan

79. Seton used in fistula in anosurgery is draining seton and:
(Recent Questions 2014, 2013)

a. Cutting seton b. Dissolving seton
c. Dissecting seton d. Fibrosing seton

ANAL FISSURE

80. Most common site of chronic fissure in ano: (GB Pant 2011)
a. Anterior b. Posterior
c. Lateral d. Anterolateral

81. Percentage of GTN used in fissure:
(GB Pant 2011)
a. 2% b. 0.2%
c. 0.02% d. 20%

82. All are treatment of acute fissure in ano except:
(AIIMS Sept 96)
a. Conservative b. Dilatation under GA
c. Lateral sphincterotomy d. External sphincterotomy

83. Sitz Bath consists of which of the following? (Karnataka 96)
a. Patient bathed in normal saline
b. Bathed in molten wax
c. Sitz in a basin containing warm antiseptic lotion
d. Sitz in a basin containing molten wax

84. Rectal examination should not be done in:
(JIPMER 90)
a. Anal fissure
b. Fistula in ano
c. Prolapsed piles with bleeding
d. Anal stenosis

85. Internal sphincterotomy is the treatment of choice for:
(JIPMER 81, AMC 86)
a. Piles b. Fistula
c. Fissure-in-ano d. Carcinoma

86. Anal fissure best diagnosed by:
(Recent Question 2014, All India 2008)
a. Anoscopy
b. History and superficial clinical examination
c. PR examination
d. USG

87. Lateral internal sphincterotomy is useful for:
(Recent Question 2014)
a. Anal fistula b. Anal canal strictures
c. Hemorrhoids d. Anal fissure

88. A sentinel pile indicates:
(MHPGMCET 2008, 2007)
a. Internal hemorrhoids b. Pilonidal sinus
c. Fissure in ano d. Fistula in ano

89. Most common site for anal fissure is:
(Recent Question 2013)
a. 3 O'clock b. 6 O'clock
c. 2 O'clock d. 10 O'clock

PILONIDAL SINUS

90. Which is not a feature of pilonidal sinus?
(PGI June 95)
a. Branching tracts are common
b. Recurrence is uncommon

- c. Bony involvement is uncommon
- d. Seen in drivers
- 91. **The following statement about pilonidal sinus is true:** (All India 2007)
 - a. More common in females
 - b. Mostly congenital
 - c. Prognosis after surgery is poor
 - d. Treatment of choice is surgical excision of sinus tract
- 92. **Jeep's disease is also known as:** (MCI March 2008)
 - a. Anal incontinence
 - b. Hemorrhoids
 - c. Pilonidal sinus
 - d. Anal fissure
- 93. **All of the following are true regarding pilonidal sinus except:** (MCI Sept 2009)
 - a. Seen predominantly in women
 - b. Occurs only in sacrococcygeal region.
 - c. Tendency for recurrence
 - d. Obesity is a risk factor
- 94. **Position for the treatment of pilonidal sinus:** (Recent Question 2015)
 - a. Jack knife
 - b. Sim's position
 - c. Prone
 - d. Supine

CARCINOMA ANAL CANAL

- 95. **Treatment of choice for squamous cell carcinoma of anal canal:** (NEET 2013, DNB 2012, JIPMER 2011)
 - a. Abdominoperineal resection
 - b. Chemoradiation
 - c. Wide local excision
 - d. CO₂ laser
- 96. **Not included in treatment of squamous cell carcinoma of anal margin:** (PGI May 2011)
 - a. Radiotherapy f/b chemotherapy
 - b. Chemotherapy f/b radiotherapy
 - c. Local excision
 - d. Radical surgery
 - e. Abdominoperineal resection
- 97. **Most common surgical complication of condyloma acuminata?** (MHSSMCET 2008)
 - a. Infection
 - b. Recurrence
 - c. Hemorrhage
 - d. Malignant change
- 98. **Virus that has increased association with anal warts:**
 - a. HPV
 - b. HIV (MHPGMCET 2009)
 - c. LMV
 - d. EBV
- 99. **Quadrivalent vaccine available for HPV protects against:** (JIPMER 2010)
 - a. HPV 6, 11, 31, 32
 - b. HPV 11, 16, 30, 33
 - c. HPV 6, 11, 16, 18
 - d. HPV 16, 18, 31, 35
- 100. **Treatment of choice for squamous cell carcinoma of anal canal not involving deep structures:** (JIPMER 2010)
 - a. Chemoradiation
 - b. Wide local excision+chemoradiation
 - c. Wide local excision+radiotherapy
 - d. Abdomino perineal resection
- 101. **Commonest type of carcinoma anal canal is:** (Recent Question 2014, AIIMS June 97)
 - a. Squamous cell carcinoma
 - b. Adenocarcinoma
 - c. Adenocanthoma
 - d. Papillary type
- 102. **Anal carcinoma is most commonly:** (PGI June 97)
 - a. Adenocarcinoma
 - b. Epidermoid
 - c. Mixed
 - d. None of the above
- 103. **Treatment of squamous cell carcinoma of anal canal is:** (Karnataka 2012, AIIMS Nov 2002)
 - a. Cisplatin based chemotherapy followed by radical radiotherapy
 - b. Abdominoperineal resection
 - c. Radical radiotherapy
 - d. Radical radiotherapy followed by mitomycin-C based chemotherapy

- 104. **Which of the following statements is true for Nigro's regimen?** (All India 2008)
 - a. It is a regimen for anal canal neoplasm
 - b. It incorporates chemotherapy with radiation as an alternative to surgery
 - c. Has the advantage of preserving continence
 - d. All of the above
- 105. **A 50-years old male, working as a hotel cook, has four dependent family members. He has been diagnosed with an early stage squamous cell cancer of anal canal. He has more than 60% chances of cure. The best treatment option is** (All India 2003)
 - a. Abdomino-perineal resection
 - b. Combined surgery and radiotherapy
 - c. Combined chemotherapy and radiotherapy
 - d. Chemotherapy alone

- 106. **For CA Anal canal, treatment of choice is:** (DNB 2012, GB Pant 2011, AIIMS Feb 97, Nov 97, June 98, All India 2006)
 - a. Surgery
 - b. Surgery + Radiotherapy
 - c. Chemoradiation
 - d. Chemotherapy

- 107. **In carcinoma of anus distal margin of clearance of anal canal of at least:** (Recent Question 2014, CMC 2001)
 - a. 2 cm
 - b. 5 cm
 - c. 4 cm
 - d. 7 cm
- 108. **Anal margin carcinoma is mostly:** (PGI SS June 2005)
 - a. SCC
 - b. BCC
 - c. Bowen's disease
 - d. Melanoma

PAGET'S DISEASE OF ANAL CANAL

- 109. **Paget's disease of anal canal is:** (JIPMER GIS 2011)
 - a. Squamous cell carcinoma in situ
 - b. Squamous cell adenoma
 - c. Intra-epithelial adenocarcinoma
 - d. Marginal anal cell carcinoma
- 110. **Which of the following is true about extra-mammary Paget's disease?** (JIPMER 2011)
 - a. MC site is vulva
 - b. MC site is penis
 - c. MC site is vagina
 - d. MC site is perianal region

ANAL CANAL MELANOMA

- 111. **True about melanoma of the anal canal is:** (PGI June 99)
 - a. Present usually as anal bleeding
 - b. AP resection gives better result than local excision
 - c. Local recurrence at the same site after resection
 - d. Radiosensitive

ANORECTAL MALFORMATIONS

- 112. **A newborn baby presents with absent anal orifice and meconuria. What is the most appropriate management:**
 - a. Transverse colostomy (MHCET 2016, All India 2008)
 - b. Conservative
 - c. Posterior sagittal anorectoplasty
 - d. Perineal V-Y plasty

113. **Invertogram is taken after:**
 a. 2 hours after birth b. 4 hours after birth
 c. 6 hours after birth d. 8 hours after birth
114. **Anorectal anomalies are commonly associated with:**
 a. Cardiac anomalies b. Duodenal atresia
 c. CNS malformations d. Abdominal (JIPMER 2011)
115. **A neonate is brought with history of not having passed meconium on examination there is no anal opening but a dimple. Investigation of choice is:** (JIPMER 90)
 a. X-ray erect posture b. X-ray supine posture
 c. Gastrograffin study d. Invertogram

RECTUM AND ANAL CANAL ANATOMY AND PHYSIOLOGY

116. **Resting tone of rectum is decreased in all except:** (All India 91)
 a. Micturition b. Retained feces in the rectum
 c. Prolapse rectum d. Trauma involving the perineum
117. **The length of a standard proctoscope is:** (TN 2004)
 a. 4 inches b. 6 inches
 c. 8 inches d. 3 inches
118. **Length of flexible sigmoidoscope:** (Recent Question 2015)
 a. 30 cm
 b. 40 cm
 c. 60 cm
 d. 70 cm
119. **Muscle which is primarily responsible for rectal continence:** (APPG 86, PGI 86, Kerala 88)
 a. External sphincter b. Internal sphincter
 c. Puborectalis d. Sacrococcygeus
120. **Below the pectineal line the lymphatic spread is to nodes:** (PGI 89)
 a. Superficial inguinal b. Internal iliac
 c. External iliac d. Para aortic
121. **Internal sphincter of rectum is formed by:** (AIIMS 79, DPG 96)
 a. Levator ani
 b. Puborectalis
 c. Longitudinal muscle fibers condensation
 d. Circular muscles fibers condensation
122. **It can be stated that the superior hemorrhoidal veins:** (AIIMS 84)
 a. Drain into the inferior mesenteric vein
 b. Have no valve
 c. Leave the anal canal at the pectinate line
 d. Cause external hemorrhoids
123. **What is false regarding dentate line?** (AIIMS 98)
 a. Glands of Morgagni open below the line
 b. Anal glands open at the line
 c. Dentate line lies 2 cms above the anal verge
 d. Transitional epithelium lies above the dentate line
124. **True statement about upper half of anal canal is:**
 a. Insensitive to pain
 b. Drained by superficial inguinal lymph node
 c. Lined by squamous epithelium
 d. Supplied by superior mesenteric artery
125. **Not true about the anal canal is:** (PGI 99)
 a. Completely lined by stratified squamous epithelium
 b. Supplied by pudendal nerve
 c. Drained by veins forming portosystemic anastomosis
 d. Part below pectinate line is supplied by inferior rectal artery
126. **Which of the following statement about valves of Houston is true?** (All India 2012, AIIMS GIS Dec 2011)
 a. The middle valve corresponds to middle convex fold to right
 b. The upper valve corresponds to peritoneal reflection
 c. The valve contain all the three layer of muscle wall
 d. Valves disappear after mobilization of rectum
127. **A patient with external hemorrhoids develops pain while passing stools. The nerve mediating this pain is:** (Bihar PG 2014, DNB 2011, All India 2002)
 a. Hypogastric nerve b. Pudendal nerve
 c. Splanchnic visceral nerve d. Sympathetic plexus
128. **In an adult male, on per rectal examination, the following structures can be felt anteriorly except:** (All India 2005)
 a. Internal iliac lymph nodes
 b. Bulb of the penis
 c. Prostate
 d. Seminal vesicle when enlarged
129. **The following are important in maintenance of normal fecal continence except:** (All India 95)
 a. Anorectal angulation b. Rectal innervations
 c. Internal sphincter d. Haustral valve
130. **Rectal incontinence is due to involvement of:** (PGI June 2006)
 a. External anal sphincter b. Internal anal sphincter
 c. Ischiococcygeus d. Pubococcygeus
131. **Which of the following is not a component of anorectal ring?** (AIIMS May 2013)
 a. External anal sphincter
 b. Puborectalis
 c. Anococcygeal raphe
 d. Internal anal sphincter
132. **External anal sphincter is innervated by:** (AIIMS Nov 2013)
 a. S2, S3, S4 b. S2, S3
 c. L5, S1 d. L2, L3
133. **Dentate line measurement from anal margin:** (WBPG 2014)
 a. 1 cm b. 1.5 cm
 c. 2 cm d. 2.5 cm

MISCELLANEOUS

134. **Hemangioma of the rectum:** (PGI June 2007)
 a. Common tumor
 b. Fatal hemorrhage seen
 c. Ulcerative colitis like symptoms seen
 d. None
135. **Bleeding per rectum is present in all, except:** (AIIMS June 94)
 a. Meckel's diverticulum b. Sigmoid volvulus
 c. Carcinoma rectum d. Ulcerative colitis
136. **A young office executive, on tout, presents with bright red painless bleed since 7 days and abdominal pain. External and per-rectal examinations are normal. As attending general practitioner what will be your next step:** (AIIMS Nov 2010)
 a. Proctoscopy
 b. Do a barium enema
 c. Refer to surgeon for sigmoidoscopy
 d. Refer to gastroenterologist for colonoscopy
137. **Not a cause of acute anal pain:** (AIIMS Nov 2012)
 a. Thrombosed hemorrhoids
 b. Acute anal fissure
 c. Fistula in ano
 d. Perianal abscess

Clinical Features

- Age of presentation in CA rectum: Above 55 years
- Bleeding is the earliest and MC symptom^Q.
- Sense of incomplete defecation^Q

Sense of Incomplete Defecation

- Sensation that there are more feces to be passed (**tenesmus**, a distressing straining to empty the bowels without resultant evacuation^Q).
 - This is a very important **early symptom** and is **almost invariably present in tumours of the lower half of the rectum**^Q.
 - The patient may endeavor to **empty the rectum several times a day (spurious diarrhea)**, often with the **passage of flatus and a little blood-stained mucus ('bloody slime')**^Q.
- **Alteration in bowel habit:** Patient has to **get up early in order to defecate**^Q, or one who **passes blood and mucus** in addition to feces ('**early-morning bloody diarrhea**'^Q), is usually found to be suffering from carcinoma of the rectum.
 - Patient with an **annular carcinoma** at the **rectosigmoid junction** suffers with **increasing constipation**, and the one with a **growth in the ampulla** of the rectum who has **early-morning diarrhea**^Q.

- **Pain in the back**, or **sciatica**, occurs when the **cancer invades the sacral plexus**^Q.
- **Weight loss** is suggestive of **hepatic metastases**^Q.

Diagnosis

- Sigmoidoscopy (rigid, not flexible) and Biopsy: Investigation of choice for diagnosis of CA rectum^Q
- TRUS (Transrectal ultrasound): **Best for 'T' staging**^Q
- Endorectal coil MRI: **Best for predicting LN invasion and overall staging**^Q
- CECT: Evaluation of metastasis

Treatment of Carcinoma Rectum

Stage 0 (Tis, N0, M0)	Local excision ^Q
Stage I: Localized Rectal Carcinoma (T1–2, N0, M0)	<ul style="list-style-type: none"> • Polypectomy with clear margins^Q • Radical resection in good-risk patients with unfavorable histologic characteristics and located in the distal third of the rectum^Q
Stage II: Localized Rectal Carcinoma (T3–4, N0, M0)	Preoperative chemoradiation + radical resection ^Q
Stage III: Lymph Node Metastasis (Tany, N1, M0)	Preoperative chemoradiation + radical resection ^Q
Stage IV: Distant Metastasis (Tany, Nany, M1)	<ul style="list-style-type: none"> • Palliative procedures^Q • Resection to control pain, bleeding, or tenesmus

12. Ans. a. 2 cm (Ref: Sabiston 19/e p1359–1360; Schwartz 9/e p1050; Bailey 26/e p1229, 25/e p1233; Schackelford 7/e p2061)

TUMOR MARGIN FOR CURATIVE EXCISION

- In GI malignancies (stomach^Q, small intestine^Q, colon^Q and proximal rectum^Q), tumor margin for curative excision is 5cm^Q except:
 - Esophagus: 10 cm^Q
 - Distal rectum: 2 cm^Q

13. Ans. a. Irrigation of divided bowel ends with cytotoxic solution may reduce local true recurrence (Ref: Bailey 25/e p1236)

- Bailey says "In each of the procedures, it is essential to ensure that **any free tumour cells released by mobilisation of the rectum are destroyed by irrigation of the rectal lumen with a cancericidal solution** such as 1% cetrimide^Q. By so doing, the implantation of such cells and subsequent local recurrence is prevented. However, it should be realised that, although a **small percentage of local recurrences** are due to **implantation of shed cells**, the **majority result from inadequate removal of the tumour** at the time of the **initial operation**^Q.

14. Ans. a. Surgical resection only

15. Ans. c. Dissection lateral to endopelvic fascia investing the mesorectum causes local recurrence
Dissection medial to endopelvic fascia investing the mesorectum causes local recurrence.

16. Ans. a. T2N0, T1N1

17. Ans. c. Transanal resection

Best treatment for this patient is **local resection**, as the **tumor is involving less than one third circumference of the rectum**. **Transanal resection** is the best among the provided options.

18. Ans. a. 2 cm and 5 cm (Ref: Bailey 26/e p1229, 25/e p1233)

- Bailey says "Provided a **minimum distal margin of clearance of 2 cm**^Q can be secured, it is safe to restore gastrointestinal continuity (Williams). The **principles of the operation** involve **radical excision** of the **neoplasm**, **removal of the mesorectum** and **high proximal ligation** of the **inferior mesenteric lymphovascular pedicle**^Q."
- The **proximal and radial margin** should be **at least 5 cm**^Q.

19. Ans. b. Abdominoperineal resection (Ref: Sabiston 19/e p1359-1360; Schwartz 9/e p1049-1051; Bailey 26/e p1229-1234, 25/e p1234-1237; Schackelford 7/e p2066-2067)

Treatment Options for Carcinoma Rectum	
Low Anterior Resection	<ul style="list-style-type: none"> • Sphincter saving operation^Q • Performed for the cancers of proximal third to two third of the rectum (Located > 5 cm above^Q the anal verge) • Descending colon is anastomosed with the distal rectum
Abdominoperineal Resection (APR or Miles Procedure)	<ul style="list-style-type: none"> • Complete excision of rectum and anus, by concomitant dissection through the abdomen and perineum with creation of permanent colostomy^Q. • Performed for carcinoma of lower rectum (at or below 5 cm from anal verge)
Hartmann's Procedure	<ul style="list-style-type: none"> • When there is too much destruction or sepsis to allow a safe anastomosis^Q • For elderly or severely unstable patients^Q who would not stand a lengthy anterior resection or APR procedure

20. Ans. c. MRI Scan (Ref: Sabiston 19/e p1357-1358; Schwartz 9/e p1047-1048; Bailey 25/e p1232; Maingot 11/e p701)

ENDORECTAL-COIL MRI

- Endorectal-Coil MRI can **identify involved perirectal nodes** on the basis of characteristics other than size. It can **identify foci** not only **within the mesorectum** but also **outside the mesorectal fascia** such as **pelvic side walls**^Q.
- **Best for predicting LN invasion and overall staging**^Q

21. Ans. c. Abdominoperineal resection

22. Ans. a. Anterior resection

23. Ans. b. Abdominoperineal resection

24. Ans. a. Most common type is adenocarcinoma, b. Surgery is the treatment of choice, c. Surgical treatment indicated in spite of hepatic metastasis

25. Ans. c. Bleeding P/R

26. Ans. d. More than 4 cm from anal verge

27. Ans. b. Distance from anal-verge

28. Ans. b. CA rectum

29. Ans. b. Histological grading (Ref: Sabiston 19/e p1357; Schackelford 7/e p2134)

NO EFFECT ON PROGNOSIS

- **No effect on Prognosis: Tumor size and duration** of symptoms^Q
- **Tumor size and configuration** (endophytic, exophytic, annular) **do not carry any prognostic significance**^Q in colorectal carcinoma.

30. Ans. b. Anterior resection

31. Ans. a. Abdominoperineal resection.

32. Ans. c. Signet ring carcinoma

33. Ans. b. Barium enema

34. Ans. c. Hartmann's operation

35. Ans. c. Preserving the anal sphincter

36. Ans. d. Cancer is less than 5 cm from anorectal margin

37. Ans. a. 2 cm

38. Ans. b. Per rectal examination can diagnose only 10% of cases

HEMORRHOIDS

39. Ans. c. Third degree no surgery (Ref: Sabiston 19/e p1387-1391; Schwartz 10/e p1222-1225, 9/e p1057-1059; Bailey 26/e p1250-1257, 25/e p1253-1259; Shackelford 7/e p1896-1906)

Surgery can be done for 3rd degree not controlled by other measures.

HEMORRHOID

- Recent theories regard hemorrhoids as **normal anatomical structures**^Q.
- These are **cushions of submucosal tissue** containing **venules, arterioles, smooth muscle fibres and elastic connective tissue**.
- Three hemorrhoidal cushions are found in the **left lateral, right anterior and right posterior position (3, 7 and 11 O' Clock)**^Q
- Hemorrhoids or **piles** are **symptomatic anal cushions**

- More common when intra-abdominal pressure is raised, e.g. in obesity, constipation and pregnancy^Q
- Symptoms: **bright-red, painless bleeding, mucus discharge and prolapse**
- Hemorrhoids cannot be palpated, **best diagnosed by proctoscopy**^Q.

Internal Hemorrhoids	External Hemorrhoids
<ul style="list-style-type: none"> Located proximal to the dentate line^Q Painless, can be ligated^Q Banding is preferred^Q 	<ul style="list-style-type: none"> Located distal to dentate line^Q Also known as 5-days painful self curing lesion Painful, not ligated^Q Excision is done^Q Repeated thrombosis leads to semi-ripe black current appearance

Classification of Internal hemorrhoids

1st degree	Painless bleeding ^Q , no prolapse
2nd degree	Prolapse through the anus, on straining but reduce spontaneously ^Q
3rd degree	Prolapse through the anal canal and require manual reduction ^Q
4th degree	Permanently prolapsed and cannot be manually reduced ^Q

Treatment

- Mere presence of hemorrhoids is not necessarily an indication of treatment.
- Treatment is **only indicated** if they are **symptomatic**. **Best treatment** is the **least invasive** one which is **possible to alleviate the symptoms**^Q.

Treatment of hemorrhoids	
Medical therapy	<ul style="list-style-type: none"> Bleeding from 1st and 2nd degree hemorrhoids often improve with the addition of dietary fibre, stool softeners and other diet regulation^Q.
Rubber band ligation	<ul style="list-style-type: none"> Done for 1st, 2nd and selected 3rd degree hemorrhoids^Q
Infrared Photocoagulation	<ul style="list-style-type: none"> Done for 1st and 2nd degree hemorrhoids
Sclerotherapy	<ul style="list-style-type: none"> Done for 1st, 2nd and selected 3rd degree hemorrhoids^Q Most commonly used sclerosant is 5% phenol in almond or arachis oil.
Operative hemorrhoidectomy ^Q	<ul style="list-style-type: none"> 3rd and 4th degree hemorrhoid^Q 2nd degree not cured by non-operative methods^Q Mixed (combine internal/external hemorrhoids)^Q Fibrosed hemorrhoids

Operative Hemorrhoidectomy

<ul style="list-style-type: none"> Milligan-Morgan open hemorrhoidectomy^Q Whitefield submucosal hemorrhoidectomy^Q 	<ul style="list-style-type: none"> Ferguson closed hemorrhoidectomy^Q Longo's stapler hemorrhoidectomy^Q
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40. Ans. c. III degree

41. Ans. b. Can be palpated on DRE in absence of complications

- Hemorrhoids cannot be palpated, **best diagnosed by proctoscopy**^Q.

42. Ans. a. Band ligation, b. 5% phenol in almond oil is used as sclerosant, c. May be resolved by diet modification, d. Hemorrhoidectomy is TOC

43. Ans. a. Painful

44. Ans. b. Internal hemorrhoids

45. Ans. d. Urinary retention (Ref: Bailey 26/e p1256, 25/e p1259; Sabiston 19/e p1389-1391; Schwartz 10/e p1223-1224, 9/e p1059)

Complications of Hemorrhoidectomy	
Early complications	Late complications
<ul style="list-style-type: none"> • Pain (MC)^Q • Acute retention of urine (2nd MC)^Q • Reactionary hemorrhage 	<ul style="list-style-type: none"> • Secondary hemorrhage • Anal stricture • Anal fissure • Incontinence

46. Ans. c. Banding

47. Ans. a. Surgery, b. Sclerotherapy

48. Ans. d. Proctoscopy

49. Ans. c. Thrombosed external hemorrhoids

50. Ans. a. They are arteriolar dilatations

51. Ans. a. Excisional surgery is cornerstone (Ref: Bailey 26/e p1252, 25/e p1256)

Mere presence of hemorrhoids is not necessarily an indication of treatment. Treatment is **only indicated** if they are **symptomatic**. **Best treatment is the least invasive one which is possible to alleviate the symptoms.**

52. Ans. a. Pain (Ref: Bailey 24/e p1259)

Most important disadvantage of cryosurgery for hemorrhoid is pain.

CRYOSURGERY

- The extreme cold (-196°C) of **liquid nitrogen** application causes **coagulation necrosis of the piles**, which subsequently separated and dropped off.
- Cryosurgery for hemorrhoids cause:
 - Pain^Q
 - Mucous discharge^Q (Not the watery discharge)

53. Ans. c. Internal hemorrhoids bleed profusely and painless

54. Ans. d. Pudendal nerve

SOLITARY RECTAL ULCER SYNDROME

55. Ans. c. Usually malignant

56. Ans. a. SRUS (Ref: Sabiston 19/e p1372; Schwartz 9/e p1054; Bailey 25/e p1227; Schackelford 7/e p1768-1769)

SOLITARY RECTAL ULCER SYNDROME

- SRUS is located on **anterior** or **anterolateral**^Q rectal wall, 7–10 cm from anal verge^Q
- May involve bowel anywhere from the sigmoid to the anorectal junction
- **More common in women, age 20-40 years**
- **Multiple ulcers** may be present within a single patch of diseased mucosa in 10–15% cases
- Endoscopically, **only half** of the patients with SRUS **have an actual ulcer**. The **remaining** patients have an area of **mucosal erythema, mucosal nodules or frank polyps**, which may or may not have surface ulcerations.

Etiology

- Internal intussusception^Q
- Anterior rectal wall prolapse^Q
- Increased intrarectal pressure^Q

Histopathology

- Mucosal hyperplasia, crypt distortion or elongation^Q
- Hypocellular lamina propria^Q
- Subepithelial fibrosis, thickened muscularis mucosa^Q
- Tongues of muscle extending to the mucosa^Q

Clinical Features

- Patients are **typically young and female**, with an **average age of 25 years** and a **history of straining and difficult evacuation**^Q.
- Commonly presents with **rectal bleeding** in the **setting of straining or constipation, pain, mucus discharge**^Q.

Diagnosis

- Defecography: Radiologic procedure of choice and usually reveals the underlying disorder^Q.
- Full-thickness rectal prolapse, internal prolapse, paradoxical Puborectalis syndrome (failure of relaxation of the pelvic floor musculature on straining) and thickened rectal folds are common findings^Q.

Treatment

- Non-operative therapy (high fiber diet, defecation training to avoid straining, laxatives or enema) is **effective in majority of the patients**^Q.
- Surgery (either abdominal or perineal repair of prolapse) is reserved for highly symptomatic patients, who have failed all medical intervention^Q.
- Rectopexy corrects anterior rectal wall prolapse^Q.

57. Ans. b Anterior, 7–10 cm from anal verge

59. Ans. c. Involves posterior wall

58. Ans. c. Lamina propria infiltration with lymphocyte

60. Ans. c. Banding, d. Sclerosant injection

RECTAL PROLAPSE

61. Ans. b. Anterior resection (Ref: Sabiston 19/e p1385-1387; Schwartz 10/e p1218-1219, 9/e p1054; Bailey 26/e p1219-1221, 25/e p1222-1226; Schackelford 7/e p1824-1832)

Abdominal rectopexy is the procedure of choice for complete rectal prolapse in young and fit patients.

Perineal procedures (Delorme's procedure) are reserved for elderly and frail patients.

Abdominal rectopexy has the least recurrence rates and is most likely to improve continence.

Perineal procedures are reserved for elderly, frail and infirm patients, who are unlikely to tolerate major 'abdominal' procedures.

RECTAL PROLAPSE

- Mucous membrane and submucosa of the rectum protrude outside the anus for approximately 1–4 cm^Q.
- It may be mucosal or full thickness (whole wall of the rectum is included)
- Commences as a rectal intussusception^Q
- In children, the prolapse is usually mucosal and should be treated conservatively
- In the adult, the prolapse is often full thickness and is frequently associated with incontinence^Q
- Surgery is necessary for full-thickness rectal prolapse^Q

Clinical Features

Children	<ul style="list-style-type: none"> • Mucosal prolapse often commences after an attack of diarrhea, or from loss of weight and consequent loss of fat in the ischiorectal fossae^Q. • It may also be associated with fibrocystic disease, neurological causes and maldevelopment of the pelvis^Q.
Adults	<ul style="list-style-type: none"> • Often associated with third-degree hemorrhoids^Q. • In the female a torn perineum, and in the male straining from urethral obstruction, predisposes to mucosal prolapse^Q. • In old age, both mucosal and full-thickness prolapse are associated with atony of the sphincter mechanism^Q.

- Prolapsed mucous membrane is pink (prolapsed internal hemorrhoids are plum colored, trifoliate and more pedunculated)^Q

Diagnosis

- Before operative intervention, a careful history, physical examination, and colonoscopy should be performed.
- Manometry should be done in cases associated with incontinence^Q.

Abdominal procedures	Perineal procedures		
<ul style="list-style-type: none">• Considered the surgical procedures of choice for young and fit individuals^Q• Not suitable for elderly and infirm patients^Q• Are most likely to improve continence^Q• Have least recurrence rates^Q• Postoperative constipation is the MC side effect^Q• Abdominal Procedures• Abdominal rectopexy<ul style="list-style-type: none">– Suture Rectopexy– Mesh Rectopexy<ul style="list-style-type: none">– Posterior (Well's Ivalon's)^Q– Anterior (Ripstein's)^Q– Lateral (Orr-Loygue)– Ventral– Resection Rectopexy (Frykman and Goldberg)• Anterior resection^Q	<ul style="list-style-type: none">• Relatively minor procedures that may be performed under local or regional anaesthesia• Well tolerated by elderly, frail and unfit patients^Q• Less likely to improve continence• Recurrence rates varying from 5–35% higher than following abdominal rectopexy^Q• Postoperative constipation is infrequent^Q <table><tr><th>Perineal Procedure</th></tr><tr><td><ul style="list-style-type: none">• Delorme's muscosectomy^Q• Thiersh and encirclement^Q• Altemeier rectosigmoidectomy^Q</td></tr></table>	Perineal Procedure	<ul style="list-style-type: none">• Delorme's muscosectomy^Q• Thiersh and encirclement^Q• Altemeier rectosigmoidectomy^Q
Perineal Procedure			
<ul style="list-style-type: none">• Delorme's muscosectomy^Q• Thiersh and encirclement^Q• Altemeier rectosigmoidectomy^Q			

62. Ans. d. 8–12 months

63. Ans. c. Thiersch wiring (Ref: Bailey 25/e p1220, 25/e p1224-1225)

TREATMENT OF RECTAL PROLAPSE IN CHILDHOOD

- Prolapse during childhood is best managed conservatively, the only exception is persistence of prolapse despite effective treatment of diarrhea, worm infestation and malabsorption^Q. These cases are managed by surgery.

Conservative Treatment	Operative Treatment
<ul style="list-style-type: none"> Effective control of diarrhea, worm infestation and correction of malnutrition^Q Sclerotherapy: 	<ul style="list-style-type: none"> Thiersch operation^Q: <ul style="list-style-type: none"> – Anal encirclement^Q Ideally suited for prolapse in myelomeningocele and sacral agenesis^Q
<ul style="list-style-type: none"> Usually reserved for prolapse of the redundant mucosa after an anoplasty or rectoplasty for an imperforate anus^Q 5% phenol in olive oil is injected submucosally^Q 	<ul style="list-style-type: none"> Lockhart Mummery Rectopexy^Q: Simplest and safest operation in childhood complete rectal prolapse^Q Posterior rectal wall stiffening

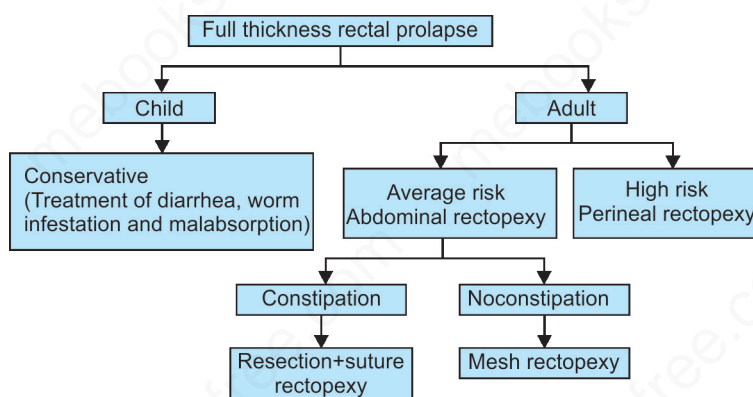
64. Ans. a. Thiersch wiring

65. Ans. a. Rectal prolapse

66. Ans. c. Abdominal rectopexy

67. Ans. a. Abdominal rectopexy

WAR	• Wells Abdominal Ripstein
PAD	• Perineal Altmier's Delorme



68. Ans. c. Thiersch's operation

ANORECTAL ABSCESS

69. Ans. d. Perianal (Ref: Sabiston 19/e p1392-1394; Schwartz 9/e p1060-1064; Bailey 26/e p1258-1259, 25/e p1261-1262 Schackelford 7/e p1914)

ANO-RECTAL ABSCESS

- Acute sepsis in the region of the anus is common.
- More common in men^Q**
- Subdivided into:** Perianal (MC)^Q, Ischiorectal (2nd MC)^Q, submucous and pelvirectal
- Underlying conditions:** Fistula-in-ano (MC), Crohn's disease, diabetes, immunosuppression^Q

Cryptoglandular theory of Intersphincteric Anal Gland Infection

- Upon infection of a gland, pus, which travels along the path of least resistance, may spread caudally to present as a perianal abscess or ischiorectal abscess^Q

Clinical Features

- Usually produces a **painful, throbbing swelling** in the anal region with **swinging pyrexia**
- Patients with infection in the larger **fatty-filled ischiorectal space**, in which **tissue tension is much lower**, usually **present later**, with **less well localized symptoms** but more constitutional upset and fever.

- Increased incidence of infection in ischiorectal fossa is due to poor blood supply^Q.**

Treatment

- Drainage of pus + Antibiotics^Q**
- Always look for a **potential underlying problem^Q**

- For **perianal and ischiorectal sepsis** (with an **incidence of 60% and 30% respectively**), **drainage is through the perineal skin**, usually through a **cruciate incision** over the **most fluctuant point**, with excision of the skin edges to de-roof the abscess.

70. Ans. c. Poor blood supply

71. Ans. a. Inflammation of anal gland

FISTULA-IN-ANO

72. Ans. a. Intersphincteric (Ref: Sabiston 19/e p1394-1396; Schwartz 10/e p1229-1231, 9/e p1064-1065; Bailey 26/e p1259-1263, 25/e p1262-1266 Schackelford 7/e p1767, 1914-1924)

FISTULA-IN-ANO

- **Fistula-in-ano** is a **chronic abnormal communication**, runs outwards from the **anorectal lumen** to an **external opening** on the skin of the **perineum** or **buttock**
- Usually **results from anorectal abscess (cryptoglandular abscess^Q)**
- **Other causes:** Crohn's disease, tuberculosis, lymphogranuloma venereum, actinomycosis, rectal duplication, foreign body and malignancy
- **Types:** **High** or **Low** (according to whether **internal opening** is **below** or **above** the **anorectal ring^Q**)

Clinical Presentation

- Non-specific anal fistulae are **more common in men** than women.
- Most commonly affect patients in **3rd-5th decade**
- Patients usually complain of **intermittent purulent discharge** and **pain^Q** (which increases until temporary relief occurs when the pus discharges).
- There is a **previous episode of acute anorectal sepsis** that settled (**incompletely**) spontaneously or with antibiotics, or which was surgically drained.

- **Passage of flatus or feces through the external opening** is suggestive of a **rectal** rather than an **anal internal opening^Q**.

Parks Classification of Fistula-in-ano (ITS-E)

- **Intersphincteric fistulae (45%): MC^Q**
 - Runs in intersphincteric space
- **Trans-sphincteric fistulae (40%):**
 - Extends through both internal and external sphincters
- **Suprasphincteric fistulae:**
 - Originates in the Intersphincteric plane and tracks up and around the entire external sphincter
- **Extrasphincteric fistulae:**
 - Originates in the rectal wall and tracks lateral to both sphincters

Clinical Assessment

- A full **medical history** and **proctosigmoidoscopy** are **necessary** to gain information about **sphincter strength** and to **exclude associated conditions**.

Key Points to Determine

- | | |
|--|---|
| <ul style="list-style-type: none"> • Site of the internal opening^Q • Site of the external opening^Q • Course of the primary track^Q | <ul style="list-style-type: none"> • Presence of secondary extensions^Q • Presence of other conditions complicating the fistula^Q |
|--|---|

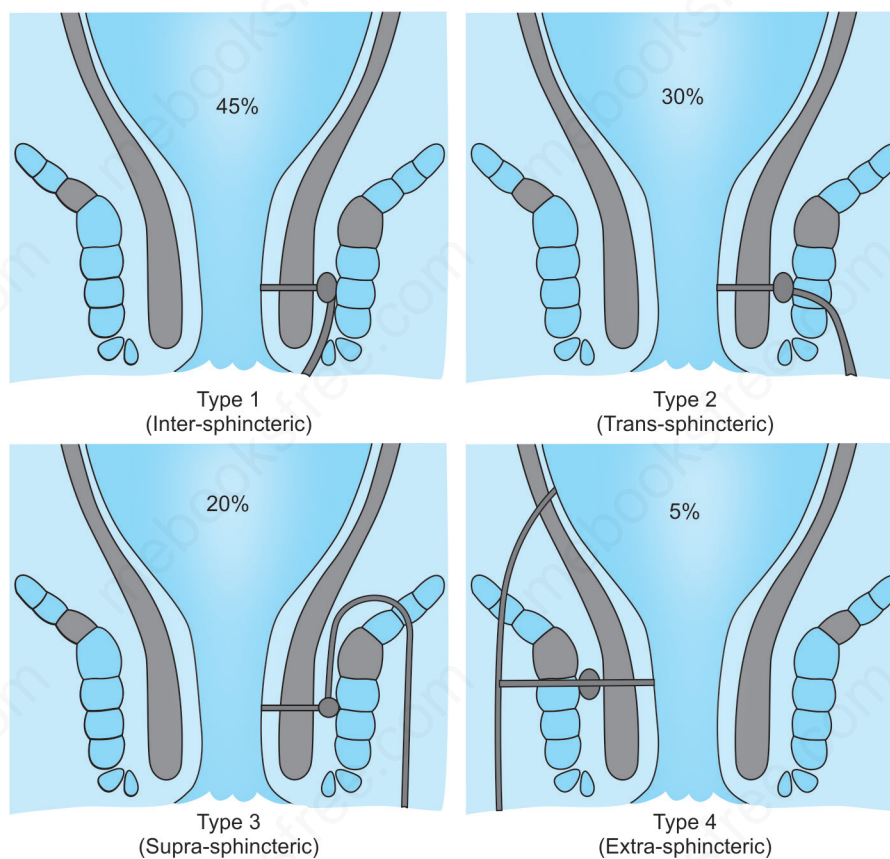
- Full examination under anesthesia should be **repeated before surgical intervention**.
- Dilute hydrogen peroxide, instilled via the external opening, is a **very useful way** of demonstrating the **site of the internal opening**

- **MRI** is the '**gold standard**' for fistula imaging^Q
- Usually **reserved for difficult recurrent cases^Q**
- **Advantage of MRI:** Its ability to **demonstrate secondary extensions**, which may be missed at surgery and which are the **cause of persistence^Q**.

- **Fistulography** and **CT:** Useful techniques if an **extrasphincteric fistula** is suspected.

Treatment

- Treatment options: **Fistulotomy, fistulectomy, setons, advancement flaps and glues**
- **Laying open** is the **surest method of eradication**, but **sphincter division** may **result in incontinence^Q**



Goodsall's rule	
<ul style="list-style-type: none"> Used to indicate the likely position of the internal opening according to the position of the external opening(s) 	
<div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">According to Goodsall's rule</p> <ul style="list-style-type: none"> Fistulas with external openings anterior to horizontal imaginary line drawn across the mid-point of anus connect to the internal opening by short straight track^Q. Fistulas with external openings posterior to horizontal line run a curvilinear course and open internally into posterior midline^Q. </div> <ul style="list-style-type: none"> Exceptions of Goodsall's rule: <ul style="list-style-type: none"> If an anterior external opening is > 3 cm from the anal margin. Such fistula track to the posterior midline. When there is an anterior and also a posterior opening of the same fistula, the rule of posterior opening applies. 	

73. Ans. a. Seton (Ref: Sabiston 19/e p1395-1396; Schwartz 10/e p1231, 9/e p1065; Bailey 26/e p1261-1263; Schackelford 7/e p1923-1924)

SETONS

- A seton is a ligature of silk, nylon, silastic or linen^Q.
- Used for **marking, draining, cutting** or **staging**^Q.
- A **high fistula** may be **converted into a low fistula** by setons^Q

Setons are useful in the management of

- Complex anorectal fistulas with risk of incontinence or poor healing^Q
- Patients with Crohn's disease^Q
- Immunocompromised (HIV) and incontinent patients^Q
- Patients with chronic diarrheal states^Q
- Anterior fistula in women^Q

74. Ans. a. Squamous cell carcinoma, b. Transitional cell carcinoma (Ref: Schackelford 7/e p1926, 6/e p2058)

CARCINOMA ASSOCIATED WITH FISTULA-IN-ANO

- MC type of carcinoma to arise in fistula-in-ano: Colloid carcinoma^Q (44%) > Squamous cell carcinoma (34%) > Adenocarcinoma (22%)
- Clue to early diagnosis is the appearance of mucin globules^Q in Fistulotomy or fistulectomy specimens

75. Ans. d. Intersphincteric is the most common type

76. Ans. d. Fistulotomy

77. Ans. c. Anorectal ring

78. Ans. b. MRI

79. Ans. a. Cutting seton

ANAL FISSURE

80. Ans. b. Posterior (Ref: Sabiston 19/e p1391-1392; Schwartz 10/e p1225, 9/e p1059-1060; Bailey 26/e p1248-1249, 25/e p1251-1253; Schackelford 7/e p1906-1912)

ANAL FISSURE (FISSURE-IN-ANO)

- An anal fissure is a longitudinal split in the anoderm, extending from the anal verge to the dentate line^Q.
- MC site: Mid-line posteriorly^Q
- MC symptom: Pain^Q

Etiology

- Trauma caused by the strained evacuation of a hard stool or from the repeated passage of diarrhea^Q.
- Anterior anal fissure: More common in women, arise following vaginal delivery.

Clinical features

- Acute fissure: Characterized by severe anal pain associated with defecation with passage of fresh blood, normally noticed on the tissue after wiping.

- Chronic fissures: Characterized by a hypertrophied anal papilla + Sentinel tag + Deep canoe shaped ulcer^Q

- Mostly seen in young adults, men and women are affected equally^Q.

Treatment

- Conservative initially, consisting of sitz bath (in a basin containing warm antiseptic lotion), stool-bulking agents and softeners, nitrates and calcium channel blockers to relax the anal sphincter and improve blood flow^Q
- Surgery if above fails, consisting of lateral internal sphincterotomy or anal advancement flap^Q

Treatment of Anal Fissure

- Chemical sphincterotomy: Nitroglycerine (0.2%^Q) or diltiazem (2%^Q) for relaxation of anal sphincter
- Lord's procedure: Dilatation of sphincter under GA, not practiced due to high rate of incontinence^Q
- Notara's lateral sphincterotomy: Surgical procedure of choice for anal fissure^Q
- Anal advancement flap: An inverted house-shaped flap of perianal skin is carefully mobilized on its blood supply and advanced without tension to cover the fissure, and then sutured with interrupted absorbable sutures.

81. Ans. b. 0.2%

82. Ans. d. External sphincterotomy

83. Ans. c. Sitz in a basin containing warm antiseptic lotion

84. Ans. a. Anal fissure

85. Ans. c. Fissure-in-ano

86. Ans. b. History and superficial clinical examination

87. Ans. d. Anal fissure

88. Ans. c. Fissure in ano

ATYPICAL FISSURES

- A fissure sited elsewhere around the anal circumference or with atypical features should raise the suspicion of a specific etiology^Q
- Early examination under anesthesia, with biopsy and culture to exclude:
 - Crohn's disease, tuberculosis^Q
 - STD (syphilis, Chlamydia, chancroid, lymphogranuloma venereum, HSV, CMV, Kaposi's sarcoma, B-cell lymphoma)
 - HIV-related ulcers^Q
 - Squamous cell carcinoma^Q

89. Ans. b. 6 O'clock

PILONIDAL SINUS

90. Ans. b. Recurrence is uncommon (Ref: Sabiston 19/e p1396-1397; Schwartz 10/e p1233, 9/e p1067-1068; Bailey 26/e p1244-1245, 25/e p1247-1249; Schackelford 7/e p1833-1840)

Recurrence is common, even though adequate excision of the track is carried out.

PILONIDAL SINUS

- Acquired disease, seen in hairy males^Q
- Seen in age group of 20–29 years
- Found in the natal cleft overlying the coccyx^Q

- Consisting of noninfected, midline openings communicating with a fibrous track lined by granulation tissue and containing hair lying loosely within the lumen.
- Common among military personnel, also known as 'jeep disease'^Q.

Etiopathogenesis

- Hair follicles have almost never been demonstrated in the walls of the sinus.
- Hairs projecting from the sinus are dead hairs, with their pointed ends directed towards the blind end of the sinus.
- Recurrence is common, even though adequate excision of the track is carried out^Q.

- It is thought that the combination of buttock friction and shearing forces in that area allows shed hair or broken hairs to drill through the midline skin, or that infection in relation to a hair follicle allows hair to enter the skin by the suction created by movement of the buttocks, so creating a subcutaneous, chronically infected, midline track^Q.
- From this primary sinus, secondary tracks may spread laterally, which may emerge at the skin as granulation tissue-lined, discharging openings^Q.

Clinical Features

- Characteristically seen in dark-haired individuals rather than those with softer blond hair
- Patients complain of intermittent pain, swelling and discharge at the base of the spine
- History of repeated abscesses that have burst spontaneously or which have been incised, usually away from the midline^Q.

- Primary sinus may have one or many openings, all of which are strictly in the midline between the level of sacrococcygeal joint and tip of coccyx^Q.
- Interdigital pilonidal sinus is an occupational disease of hairdressers^Q
- Also seen in axilla and umbilicus^Q

Treatment

- Conservative treatment: For minor symptoms, simple cleaning out of the tracks and removal of all hair, with regular shaving of the area and strict hygiene, may be recommended^Q.
- Treatment of an acute exacerbation (abscess): Abscess drainage with thorough curettage of granulation tissue and hair^Q.

Surgical treatment of chronic pilonidal disease

- Laying open of all tracks with or without marsupialisation^Q
- Excision of all tracks with or without primary closure^Q
- Excision of all tracks and closure by Limberg's flap^Q, Karydak's procedure^Q
- Bascom's procedure^Q: Incision lateral to the midline to gain access to the sinus cavity, which is rid of hair and granulation tissue and excision and closure of the midline pits. The lateral wound is left open.

91. Ans. d. Treatment of choice is surgical excision of sinus tract

92. Ans. c. Pilonidal sinus
 93. Ans. a. Seen predominantly in women
 94. Ans. a. Jack knife

CARCINOMA ANAL CANAL

95. Ans. b. Chemoradiation (Ref: Sabiston 19/e p1405-1407; Schwartz 10/e p1218, 9/e p1053; Bailey 26/e p1266-1267, 25/e p1267-1269 Schackelford 7/e p2166-2170)

CARCINOMA ANAL CANAL

- MC type of CA anal canal: SCC > BCC > Melanoma^Q
- Median age at diagnosis: 60 years^Q

- MC symptom: Bleeding PR^Q
- MC site of metastasis: Lung^Q
- MC site of LN metastasis: Inguinal LNs^Q

Risk Factors for Carcinoma Anal Canal

- | | |
|---|---|
| <ul style="list-style-type: none"> HPV infection (16, 18, 31, 33)^Q HIV or immunosuppression^Q Smoking^Q Anal receptive intercourse^Q | <ul style="list-style-type: none"> Sexual promiscuity^Q Chronic inflammation^Q Anal intra-epithelial neoplasia^Q History of vulvar or cervical cancer^Q |
|---|---|

Clinical Features

- Most patients present with rectal bleeding and pain^Q.
- Patients are frequently misdiagnosed as having a benign anorectal condition such as hemorrhoids^Q.

- Additional symptoms: Incontinence, change in bowel habits, pelvic pain, and rectovaginal or rectovesical fistulas are ominous^Q suggest advanced malignancy with infiltration into the sphincters or penetration into the rectal wall^Q

Diagnosis

- Proctoscopy with biopsy: Investigation of choice for diagnosis of CA anal canal^Q.
- CT abdomen and pelvis: Mandatory because all of the draining lymph nodes are not palpable^Q.
- CT scan: Evaluate distant metastasis

Treatment

- Nigro regimen: Chemoradiation is the treatment of choice^Q.
- More than 80% are cured by chemoradiation. If any residual tumor is left behind after chemoradiation, APR is performed^Q.

- Chemotherapy regimen: 5-FU + Mitomycin C/Cisplatin^Q
- First chemotherapy is given followed by radiotherapy^Q.

Prognosis

- Overall 5-year survival: 66%

7th AJCC: TNM Classification of Carcinoma of the Anal Canal and Anal Margin

	Anal Canal
• Tis: Carcinoma in situ (Bowen disease, high-grade squamous intraepithelial lesions (HSIL), anal intraepithelial neoplasia II-III (AIN II-III))	N1: Metastases to perirectal LNs
• T1: Tumor ≤ 2 cm in greatest dimension	N2: Metastases to unilateral internal iliac and/or inguinal LNs
• T2: > 2 cm but <5 cm in greatest dimension	N3: Metastases to perirectal and inguinal LNs and/or bilateral internal iliac and/or bilateral inguinal LNs
• T3: > 5 cm in greatest dimension	Anal Margin
• T4 (Anal Canal): Invading adjacent structures: vagina, urethra, or bladder (involvement of the sphincter muscle alone, rectal wall, or perirectal subcutaneous tissue or skin is not classified as T4)	N1: Metastases to ipsilateral inguinal LNs
• T4 (Anal Margin): Invading deep extradermal structure: skeletal muscle or bone	M1: Distant metastasis

Staging	
Stage 0	Tis N0M0
Stage I	T1 N0M0
Stage II	T2 N0M0 T3 N0M0
Anal Canal	
Stage IIIA	T4 N0M0 T1-3 N1 M0
Stage IIIB	T4 N1 M0 Any T N2,3 M0
Anal Margin	
Stage III	T4 N0 M0 Any T N1 M0
Both	
Stage IV	Any T Any N M1

96. Ans. a. Radiotherapy f/b chemotherapy, d. Radical surgery (Ref: Sabiston 19/e p1402-1405; Schwartz 9/e p1053; Bailey 26/e p1266-1267, 25/e p1267-1269; Schackelford 7/e p2173)

ANAL MARGIN TUMORS

- These tumors arise on the perianal skin^Q beyond the anal verge.
- Squamous cell carcinoma of the anal margin is treated by primary surgical excision similarly to skin cancers^Q.
- Metastases are late and rare, and recurrences are typically locoregional.
- Symptoms include pain, bleeding, itching, and palpable mass.
- Diagnosis is often suspected by the experienced clinician on inspection, but biopsy prior to definitive treatment is imperative.

- Small lesion: Wide-local excision^Q
- Large lesion or sphincter involvement: Chemoradiation^Q

97. Ans. b. Recurrence

98. Ans. a. HPV (Ref: Sabiston 19/e p1402; Schwartz 10/e p485,1232,1233,1678,1680, 9/e p1053; Bailey 26/e p1263-1264, 25/e p1266-1267; Schackelford 7/e p2172)

ANAL WARTS OR CONDYLOMATA ACCUMINATA

- HPV forms the etiological basis of: Anal and perianal warts, AIN, and SCC of the anus^Q.
- Subtypes (16, 18, 31, 33) are associated with a greater risk of progression to dysplasia and malignancy^Q.
- Condylomata accuminata is the MC STD encountered by colorectal surgeons^Q
- Most frequently observed in homosexual men^Q.

Clinical Presentation

- Many are asymptomatic but pruritus, discharge, bleeding and pain are usual presenting complaints^Q.
- Rarely, relentless growth results in giant condylomata (Buschke- Löwenstein tumour), which may obliterate the anal orifice^Q.
- Diagnosis is confirmed by biopsy^Q

Treatment

- Application of 25% podophyllin^Q
- Surgical excision^Q
- Recurrence is common^Q

99. Ans. c. HPV 6, 11, 16, 18 (Ref: Maingot 11/e p732)

HPV VACCINES

- Gardasil is a recombinant vaccine against HPV types 6, 11, 16, 18^Q.
- It is currently approved for use in females age 9–26 years of age and requires a series of three injections over a 6 month period^Q.
 - Nearly 100% prevention rate in genital warts, and vulvar, vaginal, and cervical precancerous lesions caused by the serotypes against which the vaccine is directed^Q.
- Vaccine is only effective in patients not previously exposed to the viruses included in the vaccine, and it confers no protection against viruses not covered by the vaccine^Q

100. Ans. a. Chemoradiation

101. Ans. a. Squamous cell carcinoma

102. Ans. b. Epidermoid

EPIDERMOID CARCINOMA OF ANUS

- Epidermoid carcinoma of the anus includes SCC, cloacogenic carcinoma, transitional carcinoma and basaloid carcinoma^Q.
- The clinical behavior and natural history of these tumors are similar^Q.

103. Ans. a. Cisplatin based chemotherapy followed by radical radiotherapy

104. Ans. d. All of the above

105. Ans. c. Combined chemotherapy and radiotherapy

106. Ans. c. Chemoradiation

107. Ans. a. 2 cm

108. Ans. a. SCC

PAGET'S DISEASE OF ANAL CANAL

109. Ans. c. Intra-epithelial adenocarcinoma (Ref: Sabiston 19/e p1405; Bailey 26/e p590, 25/e p1269; Schackelford 7/e p2174-2175; Maingot 11/e p743-744)

PAGET'S DISEASE OF ANAL CANAL

- MC site of extra-mammary Paget's disease: Anogenital region > Axilla > eyelid
- MC site in females: Vulva^Q
- More common in females, median age of 65 years.
- It can be associated with the presence of rectal adenocarcinoma^Q

- Perianal Paget's is associated with an underlying visceral malignancy in 20–86% of cases^Q.
- MC synchronous tumor: Colorectal adenocarcinoma^Q

Pathology

- Found in both the anal canal and margin.

- Perianal Paget's cells are foamy and vacuolar in appearance^Q
- Positive for PAS, mucicarmine, Alcian blue, and cytokeratin 7^Q.

Clinical Features

- Occurs in apocrine, hair-bearing areas^Q.
- Erythematous, pruritic, scaling plaques with well-defined serpiginous borders are a typical feature of the disease^Q.
- Lesions may also appear ulcerated and crusty with a serous discharge.

Diagnosis

- Diagnosis is made on biopsy^Q.

Treatment

- Wide local excision is treatment of choice^Q.
- Recurrence rates as high as 61% have been reported following excision of perianal Paget's disease^Q.
- Re-excision is the usual recommendation^Q

110. Ans. a. MC site is vulva

ANAL CANAL MELANOMA

111. Ans. a. Present usually as anal bleeding (Ref: Sabiston 19/e p1407; Schwartz 10/e p1218, 9/e p1053-1054; Bailey 26/e p1267, 25/e p1269; Schackelford 7/e p2173; Maingot 11/e p742)

ANAL CANAL MELANOMA

- MC site of melanoma: Skin > Eye > Anorectum^Q
- More common in females^Q
- The tumor can appear small and polypoid, or large and ulcerating.

Clinical Features

- Most common symptoms include bleeding, itching, the presence of a mass, pain, tenesmus, or changes in bowel habits^Q.
- Like anal squamous cell carcinoma, misidentification of the tumor as a hemorrhoid^Q is a common mistake.
- Mesorectal lymph node metastases are found in 40–60% of patients at initial presentation and inguinal adenopathy is present in at least 20%.
- Distant spread occurs to the bone, lung, and liver.

Diagnosis

- Diagnosis is frequently made following hemorrhoidectomy or local excision of the perianal mass.
- Like melanoma of the skin, anorectal melanoma is staged by depth or thickness of the lesion.

Treatment

- Wide local excision has replaced APR for the treatment of anal melanoma^Q.
- Wide local excision with negative margins for those patients without anal sphincter involvement^Q.
- Palliative APR: Large tumor invading sphincter^Q

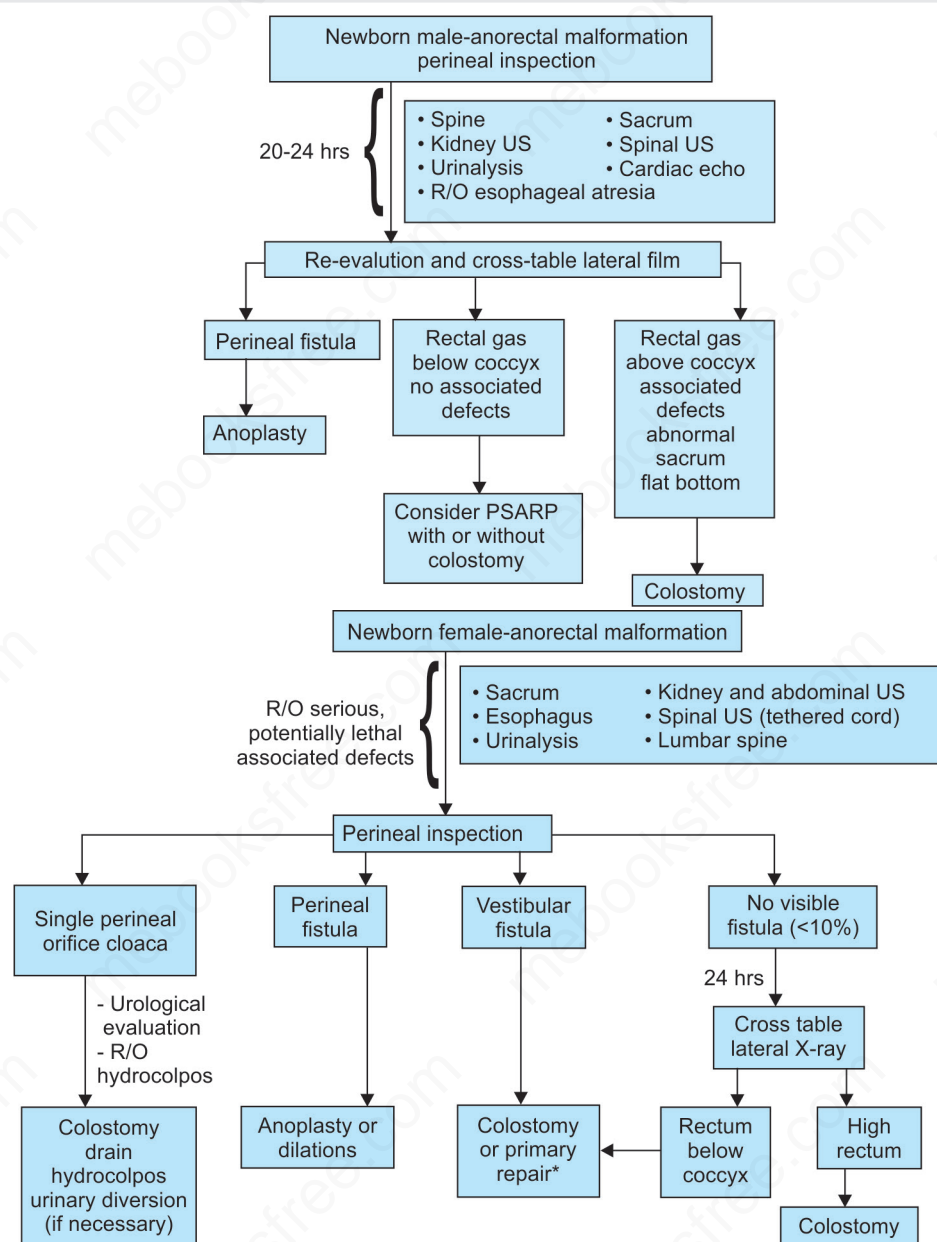
Prognosis

- Regardless of stage, 5-year survival rates for anorectal melanoma is **very poor**, averaging about 6%.
- The **median survival time** following diagnosis is **12–18 months**^Q.

ANORECTAL MALFORMATIONS

112. **Ans. a. Transverse colostomy** (Ref: Nelson 18/e p1637; Sabiston 19/e p1849-1851; Schwartz 10/e p1626-1628, 9/e p1437-1438; Bailey 26/e p1242-1243, 25/e p1244-1249; Schackelford 7/e p2273-2288)

- The presence of **meconium in urine** reflects some form of **communication** between the **urinary tract** and **rectum**, and suggests a **high type of anorectal malformation**^Q.
- Such patients **require a diverting colostomy**. The **colostomy decompresses the bowel** and **provides protection** during the healing of subsequent repair^Q.
- **Posterior Sagittal Anorectoplasty (PSARP)** is performed **after 4–8 weeks**.
- The presence of **meconium in urine** and a **flat bottom** are considered **indications of a protective colostomy**^Q.



* Depending on the experience of the surgeon and general condition of the patient

MANAGEMENT OF PATIENTS WITH ANORECTAL MALFORMATIONS

- The principles of management centre around **diagnosing the type of defect** present, **Low** or **High**, depending on the **site of termination of rectum in relation to pelvic floor**.
- Wangensteen-Rice (**Invertogram**) is performed **6–12 hours after birth**.

High lesions	Low lesions
• Rectum ends above the level of the level-ani complex	• Rectum ends below the level of levator ani complex
Clinical clues suggesting Low lesion	Clinical clues suggesting High lesion
<ul style="list-style-type: none"> Bucket Handle: <ul style="list-style-type: none"> Presence of a prominent midline skin tag stem tap, below which one can pass an instrument. Midline Raphe Fistula: <ul style="list-style-type: none"> A subepithelial meconial fistula which looks like a black ribbon, placed in the midline in the perineum. Perineal Fistula (meconial): <ul style="list-style-type: none"> The presence of meconium coming out through a small orifice located usually anteriorly to the centre of anal dimple Anal Stenosis: <ul style="list-style-type: none"> Very narrow anal canal Anal membrane: <ul style="list-style-type: none"> Very thin epithelial membrane through which one can see meconium 	<ul style="list-style-type: none"> Flat bottom: <ul style="list-style-type: none"> This usually reflects poor muscle structures and is always associated with very high defects. Meconuria (Meconium in urine): <ul style="list-style-type: none"> The presence of meconium in urine means that some form of communication exists between the urinary tract and rectum. It suggests a high lesion.

Management

- High lesions**: Patients with **high lesions** are **difficult to manage** and **require an initial protective colostomy**. **Posterior Sagittal Anorectoplasty (PSARP)** is performed after 4–8 weeks.
- Low lesions**: Can be treated with a **perennial anoplasty** (without the need of a protective colostomy).

113. Ans. c. 6 hours after birth

114. Ans. a. Cardiac anomalies

115. Ans. d. Invertogram

- Anorectal malformations are associated with VACTERL abnormalities.

RECTUM AND ANAL CANAL ANATOMY AND PHYSIOLOGY

116. Ans. b. Retained feces in the rectum

117. Ans. a. 4 inches (Ref: Bailey 26/e p1239–1240, 25/e p1221–1222)

Proctoscope	10–12 cm ^Q
Rigid sigmoidoscope	25 cm ^Q
Flexible sigmoidoscope	60 cm ^Q
Colonoscope	160 cm ^Q

118. Ans. c. 60 cm

119. Ans. c. Puborectalis (Ref: Maingot 11/e p663)

- Rectal continence depends solely on the anorectal ring** and any damage to this ring results in rectal incontinence.
- The anorectal ring is **muscular ring** present at the **anorectal junction**.
- Anorectal ring is formed by fusion of**:
 - Puborectalis** (a part of pubococcygeus, which in turn is a part of levator ani)
 - Deep external anal sphincter**
 - Internal anal sphincter**
- The **Puborectalis muscle** appears to be **most important muscle for maintaining fecal continence**.

120. Ans. a. Superficial inguinal

121. Ans. d. Circular muscles fibers condensation

122. Ans. a. Drain into the inferior mesenteric vein, b Have no valve

123. Ans. d. Transitional epithelium lies above the dentate line

124. Ans. a. Insensitive to pain

Anal canal		
Upper (Mucous) zone	Middle (Transitional) zone	Lower (cutaneous) zone
<ul style="list-style-type: none"> Length: 15 mm^Q Lined by simple columnar mucous membrane showing anal columns of Morgagni, anal valves, anal sinus, anal papilla^Q. Pain insensitive^Q 	<ul style="list-style-type: none"> Length: 15 mm^Q Lined by non-keratinized stratified squamous epithelium without sweat and sebaceous gland^Q Pain sensitive^Q 	<ul style="list-style-type: none"> Length: 8 mm^Q Lined by non-keratinized stratified squamous epithelium with sweat and sebaceous gland^Q Pain sensitive^Q

- Dentate/ Pectinate line lies **between upper and middle part**^Q
- White line of Hilton lies at **lower limit of middle**^Q (transitional) part
- Anal glands open at the dentate line^Q

125. Ans. a. Completely lined by stratified squamous epithelium

126. Ans. d. Valves disappear after mobilization of rectum (Ref: Sabiston 19/e p1296; Schwartz 9/e p1015; Bailey 25/e p1219; Schackelford 7/e p1703)

VALVES OF HOUSTON

- The **middle valve** folds to the **left**^Q (corresponds to the anterior peritoneal reflection) and the proximal and distal to the right.
- These valves are more properly called **folds**, for they have **no specific function** as impediments to flow.
- They are lost following **full surgical mobilization**^Q of the rectum, a maneuver that may provide approx. 5 cm of additional length to the rectum^Q.

127. Ans. b. Pudendal nerve (Ref: BDC 4/e pool III/e p383)

Pudendal nerve		
Root value	Course	Branches and supply
<ul style="list-style-type: none"> S2, S3, S4^Q 	<ul style="list-style-type: none"> Leaves pelvis through greater sciatic foramen^Q Enter perineum through lesser sciatic foramen^Q 	<ul style="list-style-type: none"> Main sensory motor nerve of perineum^Q and sensory nerve of external genitalia Dorsal nerve of penis/clitoris Inferior rectal nerve^Q supply anal mucosa (lower 1/2), perineal skin and external anal sphincter Perineal nerve

128. Ans. a. Internal iliac lymph nodes

129. Ans. d. Haustral valve (Ref: Sabiston 19/e p1382-1383; Bailey 26/e p1236-1237, 25/e p1240-1241; Schackelford 7/e p1717-1722)

FECAL CONTINENCE

- Normal fecal continence requires:
 - Adequate rectal wall **compliance** to accommodate the fecal bolus^Q
 - Appropriate **neurogenic control** of the **pelvic floor** and **sphincter mechanism**^Q
 - Functional internal and external sphincter muscles^Q

ANAL CANAL PHYSIOLOGY

- Resting pressure or tone:** Due to **Internal sphincter** (90 cm H₂O)^Q
- Squeeze pressure:** Contraction of the **external anal sphincter** and **puborectalis muscle**^Q
- Principal mechanism that provides continence:** Pressure differential between the **rectum** (6 cm H₂O) and **anal canal** (90 cm H₂O)^Q.
- Anorectal angle** is produced by the **anterior pull** of the **puborectalis muscle** as it encircles the rectum at the anorectal ring and contributes to fecal continence. This angle may act as a **flap valve** or have a **sphincter-like function**^Q.

130. Ans. a. External anal sphincter, b. internal anal sphincter, d. Pubococcygeus

131. Ans. c. Anococcygeal raphe (Ref: BDC 5/e pVol-III/e p428; Maingot 11/e p663)

Anorectal ring is a muscular ring present at the anorectal junction. It is formed by the **fusion of the Puborectalis, uppermost fibers of external sphincter and the internal sphincter**.

- BDC says "Anorectal ring is a muscular ring present at the anorectal junction. It is formed by the **fusion of the Puborectalis, uppermost fibers of external sphincter and the internal sphincter**. It is easily felt by a finger in anal canal. **Surgical division** of this ring results in **rectal incontinence**. The ring is **less marked anteriorly** where the fibers of Puborectalis are absent."

ANORECTAL RING

- Rectal continence depends solely on the anorectal ring^Q and any damage to this ring results in rectal incontinence.
- The anorectal ring is **muscular ring** present at the **anorectal junction**^Q.

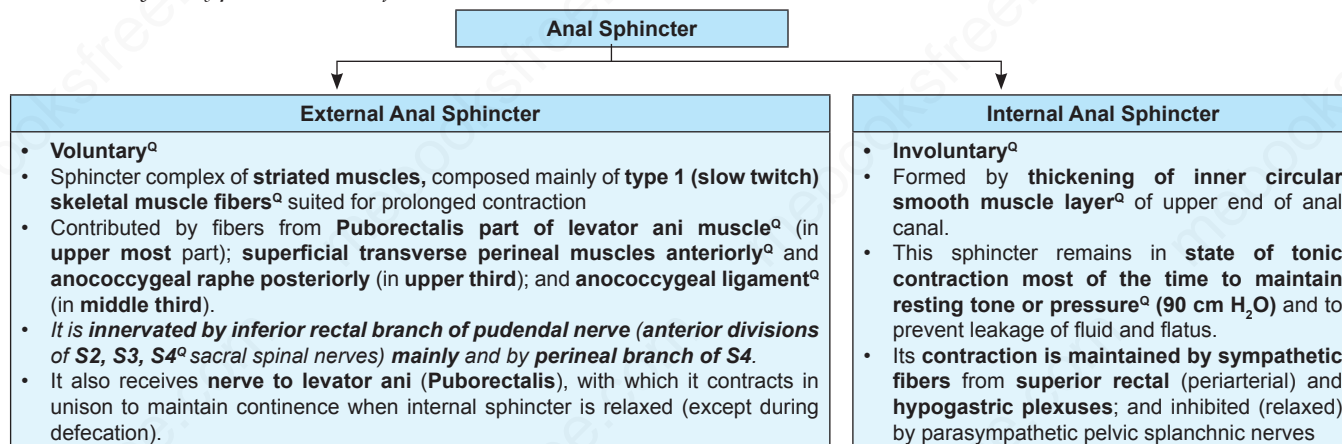
Anorectal ring is formed by fusion of

- Puborectalis^Q
- Deep external anal sphincter^Q
- Internal anal sphincter^Q

- The Puborectalis muscle appears to be **most important muscle** for maintaining fecal continence^Q.

132. Ans. a. S2, S3, S4 (Ref: BDC 5/e pvol II/e p354-355; Gray's 40/e p1158-1159; Snells 8/e p393-394)

External anal sphincter is innervated by inferior rectal branch of pudendal nerve (anterior divisions of S2, S3, S4^Q sacral spinal nerves) mainly and by perineal branch of S4.



133. Ans. c. 2 cm

- The dentate line lies about 2 cm proximal to the anal margin and roughly corresponds to the level where the distal squamous mucosa meets the more proximal columnar mucosa

MISCELLANEOUS

134. Ans. b. Fatal hemorrhage seen, c. Ulcerative colitis like symptoms seen (Ref: Bailey 26/e p1225-1226, 25/e p1230)

HEMANGIOMA OF RECTUM

- Hemangioma of the rectum is an **uncommon cause of serious hemorrhage**^Q.
- When localized in the **lower part** of the rectum or anal canal, a hemangioma can be **excised**^Q.
- When the **lesion is diffuse**, or **lying in the upper part** of the rectum, the **symptoms simulate ulcerative colitis**^Q.
- Diagnosis is often missed for a long period, or it is mistakenly thought to be a carcinoma.
- **Selective angiography and embolization** may be **helpful**, but **excision of the rectum** is sometimes **required**^Q.

135. Ans. b. Sigmoid volvulus

136. Ans. a. Proctoscopy (Ref: Bailey 26/e p1251, 25/e p1244)

- Hemorrhoids are most likely cause of fresh, painless bleed in this young patient. Next step would be to check for hemorrhoids by proctoscopy before going for more invasive procedures like sigmoidoscopy or colonoscopy to diagnose other conditions.

137. Ans. c. Fistula in ano (Ref: Bailey 26/e p1263; Sabiston 19/e p1387, 1391, 1394-1396; Schwartz 10/e p1229-1231, 9/e p1064-1065)

Fistula in ano is not a cause of acute anal pain (Patients usually complain of **intermittent purulent discharge and pain**).

Thrombosed hemorrhoids: (Sabiston 19/e p1387)

- **External hemorrhoids** are covered with anoderm and are distal to the dentate line; they may swell, causing discomfort and difficult hygiene, but cause **severe pain** only if actually **thrombosed**.

Acute Anal Fissure: (Sabiston 19/e p1391)

Characterized by **severe anal pain** associated with **defecation** with passage of fresh blood, normally noticed on the tissue after wiping.

Fistula-in-Ano: (Sabiston 19/e p1394)

Patients usually complain of **intermittent purulent discharge and pain**^Q (which increases until temporary relief occurs when the pus discharges).

(Acute anal pain is not seen in fistula-in-ano)

Perianal Abscess: (Sabiston 19/e p1392)

Usually produces a **painful, throbbing swelling** in the anal region with **swinging pyrexia**

Hernia and Abdominal Wall

MULTIPLE CHOICE QUESTIONS

CLASSIFICATION OF HERNIA

1. Type IIIA in Nyhus classification of hernia: (DNB 2011)
 - a. Direct inguinal hernia
 - b. Indirect inguinal hernia
 - c. Femoral hernia
 - d. Umbilical hernia
2. Type 7 Gilbert hernia is:
 - a. Direct inguinal hernia
 - b. Indirect inguinal hernia
 - c. Femoral hernia
 - d. Umbilical hernia
3. Femoral hernia in Nyhus classification: (WBPG 2014)
 - a. IIIA
 - b. II
 - c. IIIC
 - d. IV

RISK FACTORS FOR HERNIA

4. The following are the risk factors for inguinal hernia: (PGI Dec 2007)
 - a. Family history of inguinal hernia
 - b. Weight lifter
 - c. COPD
 - d. Female
 - e. Obesity

INGUINAL HERNIA

5. Most common type of hernia in females is: (AIIMS Feb 97, DPG 2005, JIPMER GIS 2011)
 - a. Direct inguinal hernia
 - b. Indirect inguinal hernia
 - c. Femoral hernia
 - d. Umbilical hernia
6. For differentiating inguinal hernia and femoral hernia the landmark will be: (AIIMS Nov 98)
 - a. Pubic symphysis
 - b. Femoral artery
 - c. Inferior epigastric level
 - d. Pubic tubercle
7. True statement (s) about indirect inguinal hernia:
 - a. 25% is bilateral (PGI June 2004)
 - b. In children, if inguinal (indirect) hernia is present on one side, then processus vaginalis is intact on other side
 - c. In bubonocoele sac lies in the inguinal canal
 - d. Equal incidence in male and female

INDIRECT INGUINAL HERNIA

8. True about inguinal hernia: (PGI June 2003)
 - a. It is more common in female
 - b. Right sided is more common than left side

- c. Direct hernia is less likely to undergo strangulation
 - d. Femoral hernia is more common in female
9. True statement about inguinal hernia: (PGI Nov 2011)
 - a. Overall male to female ratio is 7:1
 - b. Femoral and umbilical hernias ratio in female-to-male is same as 4:1
 - c. Inguinal hernia is commonest groin hernia in female
 - d. Incidence increases with age
 - e. Pain indicates obstruction and strangulation
 10. All of the following statements are true about repair of groin hernias except: (AIIMS Nov 2004)
 - a. Lichtenstein tension free repair has a low recurrence rate
 - b. TEP repair is an extraperitoneal approach to laparoscopic repair of groin hernia
 - c. In Shouldice repair, non-absorbable mesh is used
 - d. The surgery can be done under local anesthesia in selected cases
 11. Most important step in the repair of an indirect inguinal hernia is: (JIPMER 87)
 - a. Herniotomy
 - b. Narrowing of the internal ring
 - c. Bassini's repair
 - d. Transfixation of the neck of the sac
 12. The treatment of choice for inguinal hernia in infants is:
 - a. Herniotomy
 - b. Herniorrhaphy (AMU 85)
 - c. Truss
 - d. Hernioplasty
 13. On examination of the patient for a hernia, it is useful to realize that: (AIIMS 81, PGI 83)
 - a. An impulse is often much better seen than felt
 - b. The internal abdominal ring lies 1.25 cm above the midpoint of Poupart's ligament
 - c. The external abdominal ring lies 1.25 cm above and medial to ASIS
 - d. None of the above
 14. A patient is advised to avoid strenuous activity following herniorrhaphy for a period of: (AMU 86, 91)
 - a. One day
 - b. One week
 - c. 3 weeks
 - d. 6 weeks
 15. Which one of the following is not performed in Lichtenstein tension free hernioplasty? (Karnataka 2006)
 - a. High ligation of indirect hernia sac
 - b. Mesh sutured to the conjoint tendon and inguinal ligament
 - c. Conjoint tendon sutured to inguinal ligament
 - d. Spermatic cord is placed in two tails of the internal ring

16. **True statement regarding direct inguinal hernia:** (UPPG 2008)
 a. Most common inguinal hernia in women is direct
 b. Direct hernia is medial to inferior epigastric artery
 c. Repair of the transversalis fascia and the internal ring
 d. Descends downwards and inwards towards the scrotum
17. **Content of epilocele is:** (DNB 2011)
 a. Omentum
 b. Intestine
 c. Colon
 d. Urinary bladder
18. **Internal oblique, external oblique and transverses is retracted laterally in:** (AIIMS May 2005)
 a. Classic renal approach b. Laparoscopic approach
 c. Spigelian hernia d. _____
19. **Triangle of Doom is bounded by all of the following except:** (AIIMS Nov 2008)
 a. Cooper's ligament b. Vas deferens
 c. Gonadal vessels d. Peritoneal reflection
20. **True regarding indirect inguinal hernia are all except:**
 a. Most common type of hernia (MCI March 2008)
 b. Always unilateral
 c. Inguinal herniotomy is the basic operation
 d. Transillumination distinguishes it from hydrocele
21. **Most common type of hernia in the young age group:** (MCI Sept 2006)
 a. Femoral hernia
 b. Direct inguinal hernia
 c. Indirect inguinal hernia
 d. Umbilical hernia
22. **Least recurrence rate in incisional hernia repair is following:** (JIPMER 2010)
 a. On lay mesh repair
 b. Intra peritoneal mesh repair
 c. Inlay mesh repair
 d. Shouldice repair
23. **Inguinal herniotomy includes all of the following except:**
 a. Dissection and opening of the hernial sac (Orissa 2011)
 b. Reduction of contents
 c. Transfixation of the neck and excision of redundant sac
 d. Repair of stretched inguinal ring and fascia transversalis
24. **Hasselbach's triangle is bounded by the following, except:** (Orissa 2011)
 a. Rectus abdominis muscle
 b. Transversus abdominis muscle
 c. Inferior epigastric artery
 d. Inguinal ligament
25. **Ilioinguinal nerve is damaged while incising:** (MHSSMCET 2006)
 a. External oblique aponeurosis
 b. Internal oblique muscle
 c. Transverse abdominis
 d. Linea alba
26. **Shouldice repair is:** (PGI SS June 2007)
 a. Multilayered repair of inguinal canal
 b. Conjoint tendon is sutured to inguinal ligament
 c. Conjoint tendon is sutured to Cooper's ligament
 d. Transabdominal repair
27. **Are true about hernia repair except:** (JIPMER GIS 2011)
 a. Bassini's repair is between inguinal ligament and conjoint tendon
 b. Shouldice repair is involvement of the posterior wall strengthening
 c. Mcvay's repair is for femoral hernia
 d. Lichtenstein is a tension free-mesh repair
28. **Funicular hernia is type of:** (DNB 2007)
 a. Direct inguinal hernia b. Indirect inguinal hernia
 c. Femoral Hernia d. Umbilical hernia
29. **A child presented with a swelling in the right groin region. When the swelling was reduced, a gurgling sound was heard. Which of the following is an incorrect statement?** (AIIMS November 2015)
 a. The sac contains omentum only
 b. The hernia lies above and medial to pubic tubercle
 c. Patent processus vaginalis
 d. This type of hernia is most common in children
30. **A 3-year-old child comes with hydrocele of the hernia sac. Management will include:** (AIIMS May 2015) place it after question no. 28 in chapter 19 hernia
 a. Herniotomy
 b. Herniorrhaphy
 c. Observation only
 d. Operate after 5 years of age
31. **Triangle of doom is related to:** (Recent Question 2014)
 a. Laparoscopic Nissen's fundoplication
 b. Laparoscopic hernia surgery
 c. Endoscopic thyroidectomy
 d. Thoracoscopic thymectomy

COMPLICATIONS OF HERNIA

32. **Which of these would you like to do for a case of strangulated hernia?** (PGI June 2002)
 a. X-ray
 b. USG abdomen
 c. Aspiration of contents of sac
 d. Correction of hypovolemia
 e. Prepare OT for urgent surgery
33. **In a case of strangulated hernia management is:** (PGI June 2006, Dec 2006)
 a. USG-abdomen
 b. X-ray abdomen
 c. Aspirate contents
 d. Immediate surgery
 e. IV fluids
34. **Which of the following is not done in case of obstructed inguinal hernia?** (PGI June 2003, PGI Dec 2001)
 a. Aspiration of the sac for diagnosis
 b. X-ray abdomen
 c. USG abdomen
 d. Do early surgery
35. **During surgery of hernia, the sac of a strangulated inguinal hernia should be opened at the:** (AIIMS Nov 96, AIIMS June 2004)
 a. Neck
 b. Body
 c. Fundus
 d. Deep ring
36. **Treatment of strangulated hernia is:** (Kerala 94)
 a. Observation
 b. Immediate surgery
 c. Manual reduction
 d. Analgesics
37. **Which is the 1st sign of strangulation of inguinal hernia?** (UPPG 96)
 a. Tense
 b. Tenderness
 c. Irreducible
 d. Redness

38. During laparoscopic inguinal hernia repair a tackler was accidentally placed below and lateral to the iliopubic tract. Postoperatively the patient complained of pain and soreness in the thigh. This is due to the involvement of:

(AIIMS November 2015, May 2015)

- Lateral cutaneous nerve of thigh
- Ilioinguinal nerve
- Genital branch of genitofemoral nerve
- Obturator nerve

39. Most common nerve injured during hernia surgery:

(Recent Question 2014)

- Ilioinguinal nerve
- Iliohypogastric nerve
- Genitofemoral nerve
- None

FEMORAL HERNIA

40. True about femoral hernia is: (PGI Dec 98)

- Occurs exclusively in females
- Pregnancy is common cause
- Doesn't strangulate
- In males associated with cryptorchidism

41. Which structures live immediately lateral to femoral hernia? (AIIMS Nov 2011)

- Lateral cutaneous nerve of thigh
- Femoral nerve
- Femoral artery
- Femoral vein

42. Femoral hernia is characteristically the pubic tubercle: (MHPGMCET 2007, TN 89)

- Lateral and below
- Medial and above
- Lateral and above
- Medial and below

43. In the treatment of femoral hernia, Lockwood's operation refers to: (Karnataka 2006)

- Low inguinal operation
- High inguinal operation
- Inguinal operation
- Laparoscopic surgery

44. Strangulation most commonly occurs in: (DNB 2012, MCI Sept 2005)

- Femoral hernia
- Direct inguinal hernia
- Indirect inguinal hernia
- Lumbar hernia

45. Medial boundary of femoral ring is formed by: (JIPMER 2011)

- Inguinal ligament
- Pectineal ligament
- Lacunar ligament
- Septum separating it from femoral vein

46. A patient with femoral hernia can be managed by:

- Bassini repair
- Hunters repair
- Shouldice repair
- McVay repair

47. Hernia that lies under the fascia of pectineus muscle is: (MHSSMCET 2006)

- Cloquet's hernia
- Laugier's hernia
- Narath's hernia
- Obturator hernia

48. In Laugier's hernia opening is in the: (WBPG 2014)

- Lacunar ligament
- Conjoint tendon
- External oblique
- Peritoneum

49. Neck of sac of femoral hernia lies: (Recent Questions 2013)

- Below and lateral to pubic tubercle
- Above and lateral
- Above and medial
- Below and medial

SPIGELIAN HERNIA

50. All are true about Spigelian hernia except:

(JIPMER GIS 2011)

- Usually occurs above arcuate line
- Picked up by USG or CT
- Hernia sac will be posterior to the external oblique aponeurosis
- Usually small and asymptomatic

51. Spigelian hernia is seen in:

(All India 99)

- Lumbar triangle
- Subumbilical region
- Paraumbilical region
- Supraumbilical region

52. Spigelian hernia is a type of hernia occurring at:

(NEET 2013 PGI June 95, PGI June 2000)

- Medial border of rectus abdominis
- Lateral border of rectus abdominis
- Lumbar region
- Femoral canal

53. Spigelian hernia is:

(MCI March 2005)

- Passes through the obturator canal
- Hernia occurring through the linea alba
- Hernia through the triangle of Petit
- Hernia occurring at the level of arcuate line

54. Spigelian hernia is a defect within the following muscle:

(COMEDK 2004)

- Rectus abdominis
- Internal oblique
- Transversalis abdominis
- External oblique

SLIDING HERNIA

55. Most common content in 'Hernia en glissade' is:

(PGI June 96, All India 95)

- Omentum
- Urinary bladder
- Caecum
- Sigmoid colon

56. Viscera forms wall of which hernia?

(PGI Dec 95)

- Lumbar hernia
- Sliding hernia
- Epigastric hernia
- Femoral hernia

57. Sliding constituent of a large direct hernia is:

(All India 88)

- Bladder
- Sigmoid colon
- Caecum
- Appendix

58. Most useful investigation in sliding hernia in female:

(UPPG 2008)

- Fluroscopy
- Barium-meal
- Palpation method
- Ultrasound

59. If caecum is involved as a part of the wall of hernia sac and is not its content, then it will be known as:

(Recent Question 2014, 2008)

- Richter's hernia
- Spigelian hernia
- Sliding hernia
- Interstitial hernia

LUMBAR HERNIA

60. About lumbar hernia, false statements:

- Superior triangle is Grynfeltt's triangle
- Inferior triangle is Petit's triangle
- Mostly acquired
- More common on right side

OBTURATOR HERNIA

61. True about obturator hernia in adults: (PGI Nov 2009)

- More common in space of Lorentz
- Common in female

- c. Chronic constipation risk factor
- d. Surgical treatment should be done
- e. May present with intestinal obstruction

62. Howship-Romberg sign is seen in:

- a. Sliding hernia
- b. Obturator hernia
- c. Lumbar hernia
- d. Paraduodenal hernia

PARADUODENAL HERNIA

63. False about paraduodenal hernia: (PGI Nov 2009)

- a. Congenital
- b. Found in fossa of Kolb
- c. Found in fossa of Landzert
- d. Common on right side

64. False about paraduodenal hernia: (AIIMS GIS 2003)

- a. Left sided is found in fossa of Landzert
- b. Right sided is found in fossa of Kolb
- c. Congenital
- d. More common on right side

65. After retrocolic gastrojejunostomy, hernia occurring through window in the transverse mesocolon is: (MHSSMCET 2008)

- a. Stammer's hernia
- b. Left paraduodenal hernia
- c. Right paraduodenal hernia
- d. Hernia-en-glissede

UMBILICAL HERNIA

66. The covering over an omphalocele is: (PGI 87)

- a. Skin
- b. Amniotic membrane
- c. Chorionic membrane
- d. None of the above

67. Omphalocele is caused by: (DNB 2010)

- a. Duplication of intestinal loops
- b. Abnormal rotation of the intestinal loop
- c. Failure of gut to return to the body cavity from its physiological herniation
- d. Reversed rotation of the intestinal loop

68. In Moore's classification of omphalocele (exomphalos), type I umbilical defect is less than .. cm: (PGI 81, AIIMS 86)

- a. 0.5
- b. 2.5
- c. 3.5
- d. 4.5

69. Exomphalos major should be operated at: (PGI 81, DNB 91)

- a. Birth
- b. 3 months of age
- c. 1 year
- d. 3 years

70. Mayo's operation is done for: (2000)

- a. Spigelian hernia
- b. Femoral hernia
- c. Richter's hernia
- d. Umbilical hernia

71. Umbilical hernia in a child - indication for surgery is/are: (MAHE 2007)

- a. Failure to disappear by 3 years
- b. >2 cm size
- c. Symptomatic
- d. All of the above

72. What is false regarding gastroschisis and omphalocele? (DNB 2012, AIIMS 2000)

- a. Intestinal obstruction is common in gastroschisis
- b. Gastroschisis is associated with multiple anomalies
- c. Umbilical cord is attached in normal position in gastroschisis
- d. Liver is the content of omphalocele

73. Hernia that is least likely to strangulate is: (AIIMS Nov 93)

- a. Femoral hernia
- b. Direct inguinal hernia
- c. Indirect inguinal hernia
- d. Umbilical hernia

74. Incidence of exomphalos: (MHPGMCET 2006)

- a. 1 in 1000
- b. 1 in 3000
- c. 1 in 5000
- d. 1 in 10,000

75. True regarding gastroschisis is: (NEET Pattern, DNB 2003)

- a. An omphalocele
- b. An anterior abdominal wall tumor
- c. A variant of gastric carcinoma
- d. Herniation of abdominal contents through body wall

76. In omphalocele abdominal wall defect is more than:

- a. 0.5 cm
- b. 2.5 cm
- c. 4 cm
- d. 6 cm

EPIGASTRIC HERNIA

77. The hernia which often simulates a peptic ulcer is:

(WB PG 2015, MCI March 2007, Karnataka 94)

- a. Umbilical hernia
- b. Fatty hernia of the linea alba
- c. Incisional hernia
- d. Inguinal hernia

78. True about epigastric hernia is: (AIIMS May 2012)

- a. Located below the umbilicus and always in the midline
- b. Located above the umbilicus and always in the midline
- c. Located above the umbilicus and on either side
- d. Can be seen anywhere on abdomen

RICHTER'S HERNIA

79. The sac contains only a portion of the circumference of the intestine: (UPPG 2007, 2005)

- a. Richter's hernia
- b. Littre's hernia
- c. Spigelian hernia
- d. Lumbar hernia

80. Which of the following describes Richter's hernia?

(MCI Sept 2007)

- a. The strangulated loop of 'W' lies within the abdomen
- b. Hernia occurring at the level of arcuate line
- c. Involves only a portion of the circumference of the bowel
- d. Hernia occurring through the linea alba

81. Strangulation without obstruction is seen in: (DNB 2005)

- a. Inguinal hernia
- b. Femoral hernia
- c. Richter's hernia
- d. Littre's hernia

82. Richter hernia is most common in: (Recent Question 2014)

- a. Hiatus hernia
- b. Femoral hernia
- c. Lumbar hernia
- d. Direct inguinal hernia

LITTRE'S HERNIA

83. Which of the following is content of Littre's hernia?

- a. Urinary bladder
- b. Meckel's diverticulum
- c. Circumference of intestinal wall
- d. Appendix

84. Hernia containing Meckel's diverticulum is:

(MHSSMCET 2005)

- a. Richter's hernia
- b. Pantaloon hernia
- c. Littre's hernia
- d. Mydel's hernia

MISCELLANEOUS HERNIA

85. **About hernia, false statements:** (PGI Dec 2003)
 a. In children, indirect inguinal hernia is treated medically
 b. In Richter's hernia, absolute constipation seen
 c. Indirect inguinal hernia is the MC type
 d. Deep inguinal ring is lateral and above the public tubercle
86. **True about hernia:** (PGI Dec 2003)
 a. External abdominal hernia is common
 b. Direct hernia usually acquired
 c. Strangulation is common in femoral hernia
 d. Direct hernia is acquired in old age
 e. TOC for indirect inguinal hernia is surgery
87. **True about hernia:** (PGI Dec 2000)
 a. Direct hernias are usually acquired
 b. Femoral is most common hernia to strangulate
 c. External abdominal hernia are most common
 d. 50% old people suffer from direct type of hernia with strangulation
 e. Treatment of choice for indirect inguinal hernia is surgery
88. **Causes of recurrent hernia:** (PGI 88)
 a. Absorbable sutures b. Sliding hernia
 c. Missed sac d. Infection
89. **Hernia with hydrocele is ... hernia:** (PGI 79, AIIMS 84)
 a. Gibbon's b. Fruber's
 c. Dobson's d. Leobel's
90. **Hernia into pouch of Douglas is hernia:** (AIIMS 81, PGI 84)
 a. Beclard's b. Bochdaleks
 c. Blandin's d. Berger's
91. **The person whose work on the radical cure of hernia immortalised his name was:** (Karnataka 96)
 a. William Halsted b. Eduardo Bassini
 c. Mc Vay d. Koontz
92. **Truss cannot prevent progression of which type of inguinal hernia?** (UPPG 99)
 a. Sliding b. Littre's
 c. Indirect d. Direct

INCISIONAL HERNIA

93. **Which of the following does not predispose to abdominal wall dehiscence?** (JIPMER 92)
 a. Faulty technique
 b. Malignancy
 c. Raised intra abdominal pressure
 d. Old age
94. **Ventral hernia is a/an:** (AMC 99)
 a. Incisional hernia
 b. Umbilical hernia
 c. Femoral hernia
 d. Inguinal hernia
95. **Incisional hernia, not true is:** (DPG 2006)
 a. Faulty operative technique
 b. There is distension of abdomen
 c. Associated with infection of the wound
 d. Caused by use of local anesthesia
96. **Hernia prone to re-occur after primary repair:** (JIPMER 2013)
 a. Femoral
 b. Epigastric
 c. Spigelian
 d. Inusional

HERNIA AND ABDOMINAL WALL ANATOMY

97. **A patient operated for direct inguinal hernia developed anesthesia at the root of the penis and adjacent part of the scrotum, the nerve likely to be injured is:** (AIIMS Nov 2001)
 a. Genital branch of genitofemoral nerve (supply dartos muscle)
 b. Femoral branch of genitofemoral nerve
 c. Iliohypogastric nerve
 d. Ilioinguinal nerve
98. **During repair of indirect inguinal hernia, while releasing the constriction at the deep inguinal ring, the surgeon takes care not to damage one of the following structures:**
 a. Falx inguinalis (conjoint tendon) (AIIMS Nov 2003)
 b. Interfoveolar ligament
 c. Inferior epigastric artery
 d. Spermatic cord
99. **Preservation of ilioinguinal nerve is an important step in inguinal hernia operation while:** (UPSC 97)
 a. Incising the subcutaneous tissue
 b. Incising the external oblique aponeurosis
 c. Incising the cremasteric fascia
 d. Isolating the sac
100. **All of the following structures pass through the inguinal canal in females except:** (All India 2012)
 a. Ilioinguinal nerve b. Round ligament of uterus
 c. Lymphatics from uterus d. Inferior epigastric artery
101. **Which of the following is true about deep inguinal ring?** (DPG 97)
 a. Defect in fascia transversalis
 b. Transmits deep inferior epigastric artery
 c. Lies just above and lateral to public tubercle
 d. Opening in external oblique aponeurosis
102. **The rectus sheath contains all of the following except:** (DPG 2010)
 a. Pyramidalis muscle
 b. Genitofemoral nerve
 c. Inferior epigastric vessels
 d. Superior epigastric vessels
103. **Rectus abdominis is inserted into:** (PGI 98)
 a. Xiphoid process
 b. Median rapheae
 c. Linea alba
 d. 1-4 ribs
104. **True about inguinal canal** (PGI 2003)
 a. It is an intermuscular canal
 b. Superficial inguinal ring is situated superior and lateral to pubic tubercles
 c. Deep inguinal ring is superior-medial to attachment wall muscles
 d. In male vas deference passes through it
 e. Artery and nerve supply pass through it
105. **All are true about inguinal canal except:** (All India 2001)
 a. Conjoint tendon forms part of the posterior wall
 b. Superficial ring is found in external oblique aponeurosis
 c. Deep ring is an opening in transversalis abdominis
 d. Internal oblique forms both anterior and posterior wall
106. **The inguinal canal is not bounded posteriorly by:** (All India 1995)
 a. Transversalis fascia
 b. Internal oblique tendon
 c. Conjoint tendon
 d. Lacunar ligament

107. **Deep inguinal ring is deficiency in the**
- Internal oblique muscle
 - Transverses abdominis muscle
 - Internal spermatic fascia
 - Transversalis fascia
108. **True statement about lower 1/4th anterior abdominal wall:**
- Linea alba is poorly formed (PGI June 2006, Dec 2007)
 - Two layers of rectus sheath present
 - External oblique poorly formed
 - External oblique muscle well formed and strong
109. **True about the anatomy of inguinal hernia which is/are true:** (PGI June 2005)
- Superficial inguinal ring is an opening in external oblique aponeurosis
 - Indirect hernia lies just medial to inferior epigastric artery
 - Posterior wall is formed by transversalis fascia and conjoined tendon
 - Cremasteric artery is a branch of external iliac artery
 - Indirect hernia lies anteromedial to spermatic cord
110. **On an average, the distance between femoral ring and saphenous opening (length of femoral canal) is:**
- 1.25 cm (AIIMS 81, UPSC 87)
 - 2.50 cm
 - 3.75 cm
 - 5.00 cm
111. **The transpyloric plane passes through the:** (COMEDK 2011)
- Pylorus of the stomach
 - Fundus of the stomach
 - Fundus of the uterus
 - Fundus of the gall bladder
112. **Which of the following are associated with external oblique muscle?** (PGI Nov 2011)
- Poupart's ligament
 - Lacunar ligament
 - Superficial inguinal ring
 - Conjoint tendon
 - Cremaster muscle

UMBILICAL ADENOMA

113. **Treatment of choice of umbilical adenoma in a new born is:** (PGI 80, DPG 81, 93)
- Occlusion with a coin
 - Strapping
 - Surgery
 - Masterly inactivity
114. **"Raspberry tumour" is another name for:** (NEET 2013, PGI 85)
- Umbilical fistula
 - Umbilical granuloma
 - Umbilical adenoma
 - Meckel's diverticulum
115. **Raspberry tumour is:** (JIPMER 98)
- Neoplastic
 - Inflammatory
 - Traumatic
 - Congenital

DESMOID TUMOR

116. **Treatment of desmoid tumor is:** (AIIMS Nov 93)
- Conservative
 - Radiotherapy
 - Surgery
 - Radiotherapy following chemotherapy
117. **Regarding desmoid tumour which is not correct?**
- Often seen below the umbilicus (DNB 2002, JIPMER 87)
 - Unencapsulated
 - More common in women
 - Metastasis does not occur
 - Highly radiosensitive
118. **Recurrent fibroma refers to desmoid tumor arising in:**
- Uterus
 - Scar tissue (PGI 88)
 - Ovary
 - Muscle
119. **Treatment of choice of desmoid tumour is:** (AIIMS June 94)
- Surgery
 - Chemotherapy
 - Radiotherapy
 - Surgery + Radiotherapy
120. **What is the treatment of choice in desmoid tumors?**
- Irradiation (DNB 2009, UPSC 2008)
 - Wide excision
 - Local excision
 - Local excision following radiation
121. **Regarding desmoid tumour, true is:** (MHSSMCET 2011)
- Mostly females are affected
 - Well-capsulated tumor
 - Common above the level of umbilicus
 - Radiotherapy is treatment of choice

MISCELLANEOUS

122. **Patent vitello-intestinal duct should preferably be operated at:** (PGI 80, 81, AMU 89)
- Birth
 - 6 months of age
 - 12 months of age
 - 3 years of age
123. **Which age group most often present with jaundice due to omphalitis in infants is?** (PGI 81, Kerala 90)
- At birth
 - 24-72 hours
 - 1-3 weeks
 - 3-6 weeks
124. **The patent vitello-intestinal duct most often discharges:** (JIPMER 78,79, TN 89)
- Mucus
 - Pus
 - Urine
 - Faeces
125. **Congenital hydrocele is best treated by:** (PGI 2001)
- Eversion of sac
 - Excision of sac
 - Lords procedure
 - Herniotomy
126. **Bleeding from the umbilicus in an adult female during menstruation is suggestive of:** (All India 94)
- Bleeding diathesis
 - Vicarious menstruation
 - Persistent urachus
 - Purpura
127. **A new born presents with discharge of urine from the umbilicus for 3 days. Diagnosis is:** (UPPG 2008)
- Meckel's diverticulum
 - Mesenteric cysts
 - Urachal fistula
 - Umbilical hernia

128. A child complains of fluid coming out of umbilicus on straining. What is the diagnosis? (AIIMS November 2014)

- a. Urachal fistula
- b. Gastroschisis
- c. Patent vitellointestinal duct
- d. Congenital umbilical hernia

129. A new born presents with mid anterior abdominal wall defect with characteristic spontaneous disappearance at age 4 years: (UPPG 2008)

- a. Patent urachus
- b. Omphalocele
- c. Ectopia vesicae
- d. Umbilical hernia

130. Most common cause of umbilicus not separated at age of 2 years: (UPPG 2008)

- a. Raspberry tumour
- b. Leukocyte adhesion deficiency
- c. Patent urachus
- d. Umbilical granuloma

131. Pascal's law is used in which technique of hernia repair?

- a. Lichtenstein mesh repair (DNB 2010)
- b. Stoppa's preperitoneal repair
- c. Bassini's repair
- d. Darning repair

132. All of the following are true about hernia surgery except: (AIIMS Nov 2012)

- a. Surgery should not be done unless patient becomes symptomatic
- b. Hernia in children is treated with herniotomy
- c. Absorbable mesh should not be used for surgery
- d. Surgery can be done using laparoscopy

133. Method of reduction of inguinal hernia:

(Recent Questions 2013)

- a. Kugel manœuvre
- b. Taxis
- c. Macvay procedure
- d. Stopa's technique

EXPLANATIONS

CLASSIFICATION OF HERNIA

1. Ans. a. Direct inguinal hernia (Ref: Sabiston 19/e p1120; Schwartz 10/e p1634-1635, 9/e p1316; Schackelford 7/e p567-568)

HERNIA

- **Hernia** is derived from the Latin word for **rupture**.
- A hernia is defined as an **abnormal protrusion** of an organ or tissue **through a defect**^o in its surrounding walls.

Nyhus Classification System

Type I	• Indirect hernia; internal ring normal ; typically in infants, children, young adults ^o
Type II	• Indirect hernia; internal ring enlarged ^o without impingement on the floor of the inguinal canal; does not extend to the scrotum
Type IIIA	• Direct hernia ^o (size is not taken into account)
Type IIIB	• Indirect hernia enlarged enough to encroach upon the posterior inguinal wall ; indirect sliding or scrotal hernias and pantaloon hernias ^o
Type IIIC	• Femoral hernia ^o
Type IV	• Recurrent hernia
A	• Direct ^o
B	• Indirect
C	• Femoral
D	• Combined

2. Ans. c. Femoral hernia (Ref: Schwartz 10/e p1496, 9/e p1316; Schackelford 7/e p567-568)

Gilbert Classification System

Type 1	Small, indirect	Type 5	Diverticular, direct
Type 2	Medium, indirect	Type 6	Combined (pantaloon)
Type 3	Large, indirect	Type 7	Femoral ^o
Type 4	Entire floor, direct ^o		

SCHUMPELICK CLASSIFICATION SYSTEM

- The major feature is the **addition of orifice sizing** to traditional systems.
- The **defects** are then **graded according to size**.

<ul style="list-style-type: none"> • L: Lateral indirect site • M: Medial direct • F: Femoral 	<ul style="list-style-type: none"> • Type I: Defect size <1.5 cm in diameter • Type II: Defect size 1.5-3 cm • Type III: Defect size >3 cm
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3. Ans. c. IIIC

RISK FACTORS FOR HERNIA

4. Ans. a. Family history of inguinal hernia, b. Weight lifter, c. COPD, e. Obesity (Ref: Sabiston 19/e p1114-1115; Schwartz 9/e p1307-1308; Bailey 26/e p949-950, 25/e p968; Schackelford 7/e p558-559)

Risk Factors for Hernia

Weakness of Abdominal Muscles	Increased Intra-Abdominal pressure
<ul style="list-style-type: none"> • Patent processus vaginalis^o • Patent canal of nuck causing indirect inguinal hernia in females • Connective tissue disorders^o like Ehlers Danlos syndrome • Congenital conditions like Extrophy of bladder, Prune Belly syndrome^o • Advancing age^o • Chronic debilitating disease^o • Defective collagen synthesis^o • Previous right lower quadrant incision^o • Cigarette smoking^o 	<ul style="list-style-type: none"> • Chronic cough^o (Bronchitis, tuberculosis) • Chronic obstructive pulmonary disease^o • Obesity^o • Chronic constipation with straining at stool • Enlarged prostate with straining at micturition • Pregnancy^o • Cirrhosis with ascites^o • Heavy weight lifting^o • Chronic ambulatory peritoneal dialysis • Intra-abdominal tumors • Chronically enlarged pelvic organs

Other Risk Factors

- Birth weight <1500 gm (Pre-term)^Q
- Arterial aneurysms^Q
- Family history of a hernia
- Sex: Indirect inguinal hernia is more common in boys^Q

INGUINAL HERNIA

5. Ans. b. Indirect inguinal hernia (Ref: Sabiston 19/e p1114; Schwartz 10/e p1634-1635, 9/e p1306-1307; Bailey 26/e p954-960, 25/e p971-972; Schackelford 7/e p558)

- MC type of hernia in males: Indirect inguinal hernia^Q
- Femoral hernia is more common in females^Q.
- MC type of hernia in females: Indirect inguinal hernia^Q
- Direct inguinal hernia is more common in the elderly^Q

6. Ans. d. Public tubercle (Ref: Sabiston 19/e p1114, 1126; Schwartz 10/e p1634-1635, 9/e p1308; Bailey 26/e p954-960, 25/e p971-972; Schackelford 7/e p561)

Inguinal Hernia	Femoral Hernia
• Neck of sac lies above and medial to the pubic tubercle ^Q	• Neck of sac lies below and lateral to the pubic tubercle ^Q

7. Ans. b. In children, if inguinal (indirect) hernia is present in on side, then processus vaginalis is intact on other side, c. In bubonocoele sac lies in the inguinal canal (Ref: Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1307, 1316; Bailey 26/e p954-959, 25/e p971-973; Schackelford 7/565-568)

INDIRECT INGUINAL HERNIA

- MC form of hernia in both males and females^Q
- Indirect hernias are most common in the young, whereas direct hernias are most common in the old^Q.
- In the first decade of life, inguinal hernia is more common on the right side in the male, due to later descent of the right testis and a higher incidence of failure of closure of processus vaginalis^Q.

- In adult males, 65% of inguinal hernias are indirect and 55% are right-sided.
- The hernia is bilateral in 12% of cases^Q.
- If both sides are explored in an infant presenting with one hernia, the incidence of a patent processus vaginalis on the other side is 60%^Q.

Types of Indirect Inguinal Hernia	
Bubonocoele	• Hernia is limited to the inguinal canal ^Q
Funicular	• Processus vaginalis is closed just above epididymis ^Q . • Contents of the sac can be felt separately from testis, which lies below the hernia ^Q .
Complete scrotal or	• Testis appears to lie within the lower part of hernia ^Q .

Clinical Features

- Males are 20 times more commonly affected than females^Q.
- The patient complains of pain in the groin or pain referred to the testicle when performing heavy work or taking strenuous exercise.
- When asked to cough, a small transient bulging may be seen and felt together with an expansile impulse^Q.
- Large hernias: Sensation of weight and dragging on the mesentery may produce epigastric pain.

Treatment

- Surgery is the treatment of choice (open or laparoscopic)^Q

INDIRECT INGUINAL HERNIA

8. Ans. b. Right sided is more common than left side, c. Direct hernia is less likely to undergo strangulation, d. Femoral hernia is more common in female (Ref: Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1306, 1316; Bailey 26/e p954-959, 25/e p971-973;

Schackelford 7/e p565-568)

DIRECT INGUINAL HERNIA

- In **adult males**, 35% of inguinal hernias are **direct**^Q
 - At presentation, 12% of patients will have a **contralateral hernia**^Q
 - **Fourfold increased risk of future development of a contralateral hernia** if one is not present at the original presentation.
 - Always **acquired**^Q
 - **Sac passes through a weakness or defect of transversalis fascia** in the **posterior wall** of the inguinal canal.
 - Patient has **poor lower abdominal musculature**, presence of elongated bulgings (**Malgaigne's bulges**).
- **Women practically never develop a direct inguinal hernia**^Q.

Predisposing Factors

- **Smoking**^Q
 - Occupations that involve **straining and heavy weight lifting**^Q
- **Damage to the iliohypogastric nerve (previous appendectomy)** is another cause, because of the resulting weakness of the **conjoined tendon**^Q.
 - **IH → IH** (IlioHypogastric nerve → Inguinal Hernia^Q)

Clinical Features

- Direct hernias **do not attain a large size** or **descend into the scrotum**.
 - In contrast to an indirect inguinal hernia, a **direct inguinal hernia lies behind the spermatic cord**.
 - **Sac is often smaller than hernial mass would indicate**, the **protruding mass** mainly consisting of **extraperitoneal fat**^Q.
- As the **neck of the sac is wide**, **direct inguinal hernias do not often strangulate**^Q

9. Ans. a. Overall male to female ratio is 7:1, c. Inguinal hernia is commonest groin hernia in female, d. Incidence increases with age, e. Pain indicates obstruction and strangulation (Ref: *Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1306-1307; Bailey 26/e p954-959, 25/e p971-973; Schackelford 7/e p558*)

- Schwartz says "Seventy five percent of all abdominal wall hernias occur in the groin. Indirect hernias outnumber direct hernia by about 2:1, with femoral hernia making up a much smaller proportion. **Right sided groin hernias are more common** than those to the left. The **male to female ratio for inguinal hernia is 7:1**."
- **Incidence of hernia increase with the age**, particularly for **inguinal, umbilical and femoral**. The likelihood of **strangulation** and need for hospitalization also increases with age.
- In **obstructed hernia**, symptoms (**colicky abdominal pain** and **tenderness over hernia site**) are **less severe** and the onset is **more gradual** than in **strangulated hernia**. **Strangulated hernia** presents with **local then general pain** and **vomiting**.

10. Ans. c. In Shouldice repair, non-absorbable mesh is used (Ref: *Sabiston 19/e p1120-1126; Schwartz 10/e p1634-1635, 9/e p1318-1331; Bailey 26/e p957-959, 25/e p972-976; Schackelford 7/e p568-579*)

In Shouldice repair, inguinal floor is strengthened by approximation of tissues using non-absorbable sutures, **mesh is not used**.

Management of Inguinal Hernia

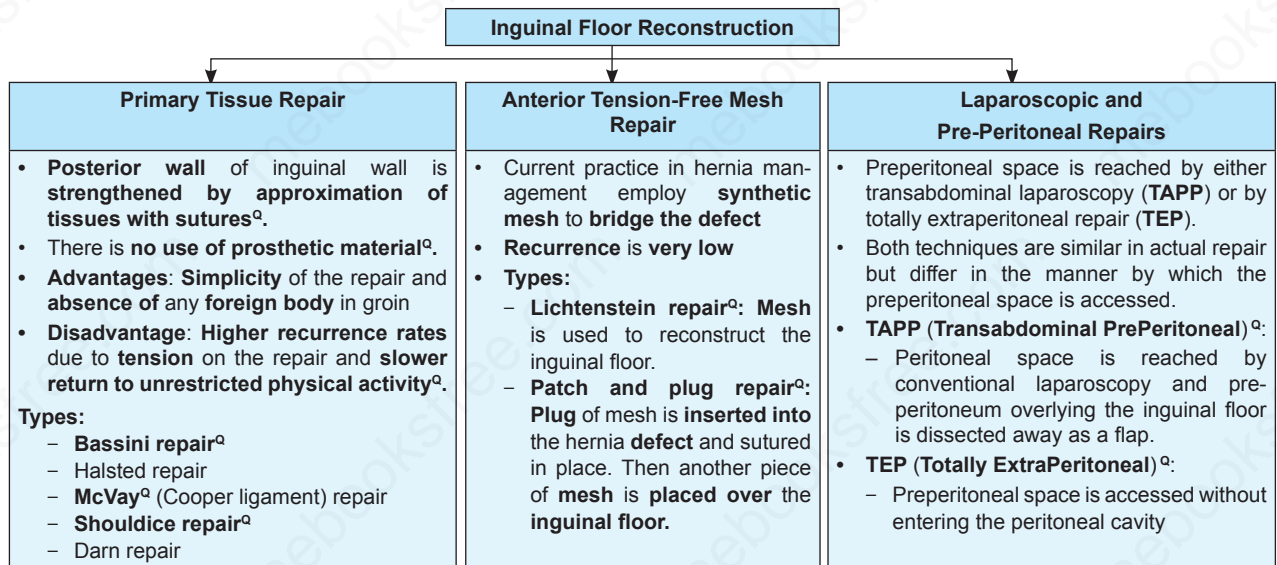
- Objectives of treatment:
 - Treatment of hernia sac
 - Inguinal floor reconstruction

Management of Inguinal Hernia**Treatment of Hernia Sac**

- Basic operation is **inguinal herniotomy**, which entails **dissecting out and opening the hernial sac**, **reducing any contents** and then **transfixing the neck of the sac** and **removing the remainder**^Q.
- **Direct sacs** are usually too broad for ligation and should not be opened but instead are simply **inverted into peritoneal cavity**^Q.

Inguinal Floor Reconstruction

- **Management of the hernia sac is sufficient for children and young adults**^Q
- **Reconstruction** (repair or strengthening) of the inguinal floor is **necessary in all adult hernias to prevent recurrence**^Q.
- **Types of repair:**
 - **Primary tissue repair**^Q
 - **Anterior tension-free mesh repair**^Q
 - **Preperitoneal repairs: Open and laparoscopic approach**^Q



11. Ans. b. Narrowing of the internal ring

Most important step of hernia repair is narrowing of internal ring.

12. Ans. a. Herniotomy

13. Ans. a. An impulse is often much better seen than felt

14. Ans. None

After herniorrhaphy, avoid strenuous activity for 6 months.

15. Ans. c. Conjoint tendon sutured to inguinal ligament (Ref: Sabiston 19/e p1123; Schwartz 10/e p1508, 9/e p1322; Bailey 26/e p959, 25/e p974; Schackelford 7/e p576)

LICHTENSTEIN TENSION-FREE REPAIR

- Initial exposure and mobilization of cord structures is identical to other open approaches.
- Lichtenstein repair does not include routine division of the transversalis fascia^Q.
- Internal inguinal ring is not reconstructed using canal structures.
- Floor and internal ring are reinforced through the application of the mesh.^Q
- Mesh is split to accommodate the spermatic cord^Q.
- Rounded edge is attached to the anterior rectus sheath^Q just medial to the pubic tubercle
- Inferior margin of the mesh is then sutured to the shelving edge of the inguinal ligament^Q

16. Ans. b. Direct hernia is medial to inferior epigastric artery (Ref: Sabiston 19/e p1114-1115; Schwartz 9/e p1306, 1316; Bailey 25/e p971-975; Schackelford 7/e p558-568)

	Indirect hernia	Direct hernia
Age	• Any age	• Common in elderly ^Q
Herniation	• Protrusion through deep inguinal ring; Herniation occurs latter ^Q	• Herniation through posterior wall of inguinal canal
Shape	• Pyriform/oval in shape ^Q	• Globular/round shape
Descent	• Obliquely and downwards	• Directly forwards
Descent to scrotum	• Descent to the bottom of scrotum and becomes complete ^Q	• Rarely descent to the bottom of the scrotum
Neck	• Narrow ^Q	• Wide ^Q
Sac	• Lateral to inferior epigastric artery	• Medial to inferior epigastric artery
Zieman's test	• Cough impulse on index finger ^Q	• Cough impulse on middle finger
Invagination test	• Tip of finger	• Pulp of finger
Ring occlusion test	• Does not bulge	• Bulge medial to occluding finger
Coverings (from inside out)	• Extraperitoneal tissue • Internal spermatic fascia ^Q • Cremasteric fascia ^Q • External spermatic fascia • Skin	• Extraperitoneal tissue • Fascia transversalis • Conjoint tendon • External spermatic fascia • Skin

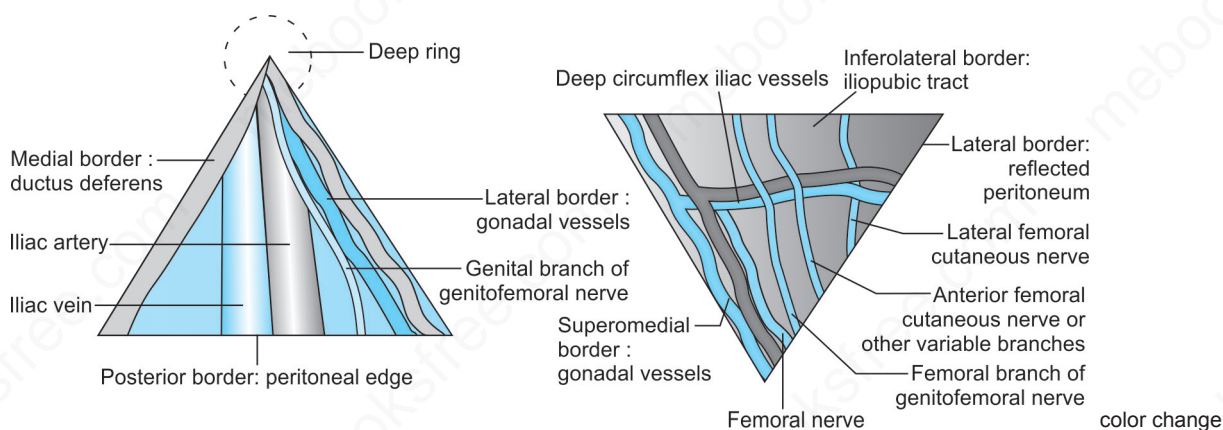
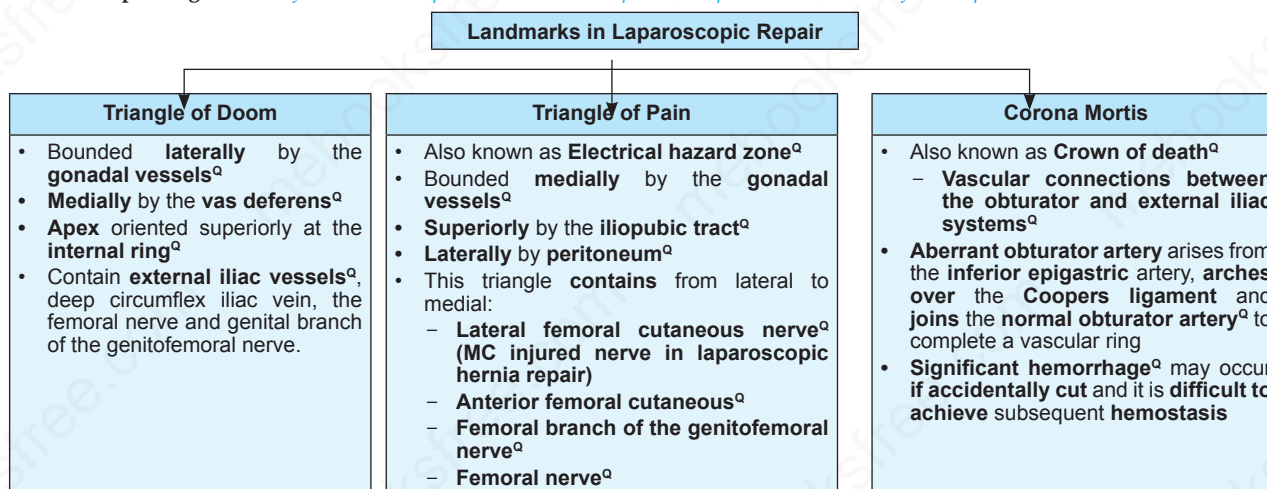
	• Commonly unilateral	• Commonly bilateral ^a
Obstruction/strangulation	• Common	• Rare
Sac	• Should be opened during surgery	• Not necessary , unless obstruction is present

17. Ans. a. Omentum (Ref: Bailey 25/e p969)

Content of Hernia	Name
Omentum	Omentocele
Intestine	Enterocoele

18. Ans. Question is incomplete, don't worry, it would not be asked again

19. Ans. a. Cooper's ligament (Ref: Sabiston 19/e p1118; Schwartz 10/e p1496, 9/e p1313-1315; Schackelford 7/e p562-565)



Space of Retzius (Retropubic space)	• Extra-peritoneal space between pubic symphysis and urinary bladder ^a
Space of Bogros (Retroinguinal space)	• Extra-peritoneal space situated deep to inguinal ligament ^a • Situated laterally and cranially to Retzius space

20. Ans. b. Always unilateral

21. Ans. c. Indirect inguinal hernia

22. Ans. b. Intraperitoneal mesh repair

23. Ans. d. Repair of stretched inguinal ring and fascia transversalis

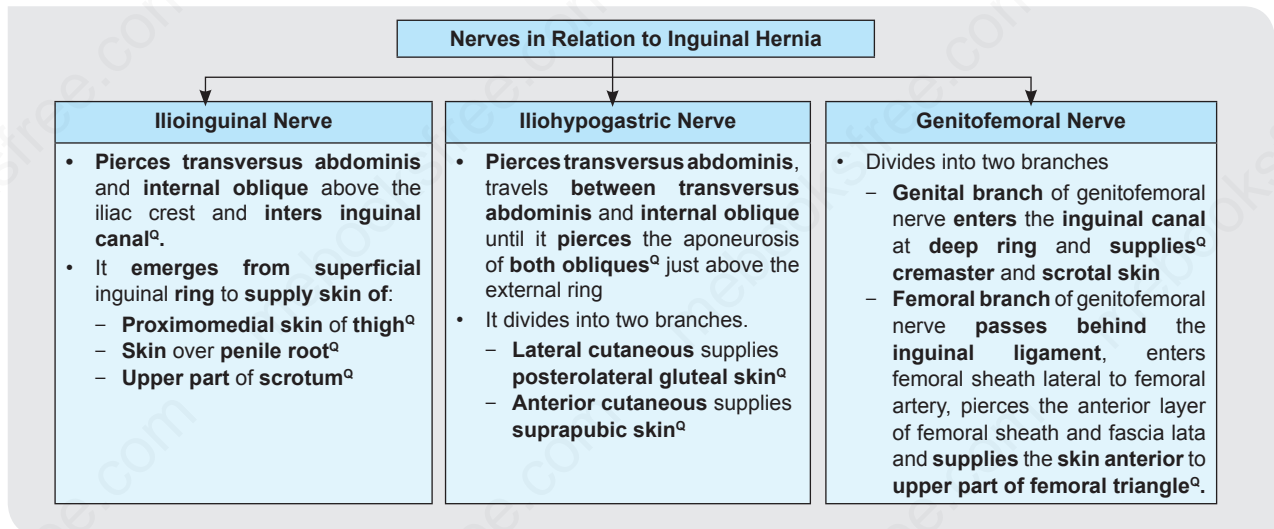
24. Ans. b. Transversus abdominis muscle (Ref: Sabiston 19/e p1118; Bailey 26/e p955, 25th/e p971; Schackelford 7/e p560)

Hesselbach's triangle		
Lateral border	Medial border	Base
• Epigastric artery ^a	• Lateral border of rectus abdominis ^a where it is attached to pubic crest	• Inguinal ligament

- **Indirect inguinal hernia** comes out of abdominal cavity **through deep inguinal ring^o**, travel inguinal canal and becomes superficial through superficial inguinal ring.
- **Direct inguinal hernia** enters inguinal canal through **medial half of weak posterior wall (Hesselbach's triangle^o)** and becomes superficial through superficial inguinal ring.

25. **Ans. a. External oblique aponeurosis** (Ref: Sabiston 19/e p1118, 1127; Schwartz 10/e p1495-1517, 1974, 9/e p1314-1315; Bailey 25/e p971, 973; Schackelford 7/e p562-563)

External oblique aponeurosis is in close relation to ilioinguinal nerve and hence during operation for inguinal hernia, prevention of injury to ilioinguinal nerve to avoid later development of incisional hernia is very important.



26. **Ans. a. Multilayered repair of inguinal canal** (Ref: Sabiston 19/e p1121; Schwartz 10/e p1495, 1506-1507, 9/e p1321; Bailey 26/e p955-956, 25/e p973; Schackelford 7/e p575)

SHOULDICE REPAIR

- Primary tenets of the procedure involve **extensive dissection and reconstruction of inguinal canal anatomy^o**.
- The use of a **continuous suture in multiple layers** resulted in the **dual advantage of distributing tension over several layers and preventing subsequent herniation** between interrupted sutures^o.
- Consists of division and **double breasting** of the transversalis fascia^o

27. **Ans. None** (Ref: Sabiston 19/e p1121; Schwartz 9/e p1320-1322; Bailey 26/e p957, 25/e p973; Schackelford 7/e p573-576)

- **Bassini's repair:** A **triple-layer repair** is then performed to restore integrity to the floor. The **medial tissues**, including the internal oblique, transversus abdominis muscle and transversalis fascia, are fixed to the shelving edge of the inguinal ligament and pubic periosteum with interrupted sutures (**Inguinal ligament is sutured to conjoint tendon^o**).
- **Shouldice repair** leads to **posterior wall strengthening^o**
- The **advantage of the McVay (Cooper's ligament) repair** is the ability to **address both inguinal and femoral canal defects^o**.

28. **Ans. b. Indirect inguinal hernia**

Complications of Groin Hernia Repairs	
<ul style="list-style-type: none"> • Recurrence • Chronic groin pain • Seroma • Hematoma • Ischemic orchitis • Testicular atrophy 	<ul style="list-style-type: none"> • Bladder injury • Wound infection • Osteitis pubis • Prosthetic complications (Contraction, Erosion, Infection)

29. Ans. a. The sac contains omentum only (Ref. Sabiston 19th/1114-1115; Schwartz 9th/1307, 1316; Bailey 26th/954-959, 25th/971-973; Shackelford 7th/565-568)

Content of Hernia	Name	Reduction
Omentum	Omentocele ^Q	<ul style="list-style-type: none"> Gurgles on reduction^Q First portion is more difficult to reduce than the last^Q.
Intestine	Enterocoele ^Q	<ul style="list-style-type: none"> Omentum is doughy^Q The last portion is more difficult to reduce than the first^Q.

30. Ans a. Herniotomy (Ref. Sabiston 19th/1120-1126; Schwartz 9th/1318-1331; Bailey 26th/111, 1382; Shackelford 7th/568-579)

Management of hydrocele of the hernia sac (congenital hydrocele) in a 3 years old child is herniotomy.

- "A patent processus vaginalis may allow only peritoneal fluid to track down around the testis to form a hydrocoele. Hydrocoeles are unilateral or bilateral, asymptomatic, non-tender scrotal swellings. They may be tense or lax, but typically transilluminate. The majority resolve spontaneously as the processus continues to obliterate, but surgical ligation is recommended in boys older than three years of age." - Bailey 26th/e p111
- "In congenital hydrocele, the processus vaginalis is patent and connects with the peritoneal cavity. The communication is usually too small to allow herniation of intra-abdominal contents. Pressure on the hydrocele does not always empty it but the hydrocele fluid may drain into the peritoneal cavity when the child is lying down; thus, the hydrocele may be intermittent. Ascites should be considered if the swelling are bilateral. Congenital hydrocoeles are treated by herniotomy if they do not resolve spontaneously." Bailey 26th/e p1382

31. Ans. b. Laparoscopic hernia surgery

COMPLICATIONS OF HERNIA

32. Ans. d. Correction of hypovolemia, e. Prepare OT for urgent surgery (Ref: Sabiston 19/e p1127; Schwartz 10/e p1634-1635, 9/e p1331-1332; Bailey 26/e p950, 25/e p970-971, 976)

STRANGULATED INGUINAL HERNIA

- Indirect inguinal hernias strangulate more commonly, the direct variety not so often because of the wide neck of the sac.
- Strangulation occurs more often in patients who have worn a truss for a long time and in those with a partially reducible or an irreducible hernia.

- MC constricting agent: Neck of the sac^Q > External inguinal ring in children > Adhesions within the sac (rarely).
- MC contents: Small intestine^Q > Omentum

- It is rare for the large intestine to become strangulated in an inguinal hernia, even when the hernia is of the sliding variety.

Strangulation During Infancy

- Incidence of strangulation in infancy is 4% and the ratio of girls to boys is 5:1.
- More frequently, the hernia is irreducible but not strangulated.
- In most cases of strangulated inguinal hernia occurring in female infants, the content of the sac is an ovary or an ovary plus its fallopian tube^Q.

Diagnosis

- Diagnosis of strangulation is made on clinical grounds.

Diagnosis

- Diagnosis of strangulation is made on clinical grounds.

Clinical features of Strangulated Inguinal Hernia

- In addition to patient having developed an irreducible hernia and an intestinal obstruction, patient develops sudden pain, at first situated over hernia, followed by generalized abdominal pain.
- The hernia is tense and extremely tender^Q.
- The overlying skin may be discolored with a reddish or bluish tinge^Q.
- There is no expansile cough impulse^Q.

Treatment

- Vigorous resuscitation with intravenous fluids, nasogastric aspiration and antibiotics is essential followed by emergency operation^Q.
- Inguinal herniotomy for strangulation:
 - An incision is made over the most prominent part of the swelling.
 - Each layer covering the anterior surface of the body of the sac “near fundus”^Q is incised and, if possible, stripped off the sac.
 - The sac is then incised and any fluid, which may be highly infective, drained effectively^Q.
- Devitalised omentum is excised after being securely ligated.
- Viable intestine is returned to the peritoneal cavity^Q.
- Doubtfully viable and gangrenous intestine is excised^Q.
 - If the incision has been soiled or gangrenous bowel resected^Q, prosthetic mesh should not be used^Q.
 - Biosynthetic meshes made from collagen or dermis are totally absorbed, are more suited to use in a contaminated environment^Q.

33. Ans. d. Immediate surgery, e. IV fluids
34. Ans. a. Aspiration of the sac for diagnosis, b. X-ray abdomen, c. USG abdomen
35. Ans. c. Fundus
36. Ans. b. Immediate surgery
37. Ans. b. Tenderness
38. And. a. Lateral cutaneous nerve of thigh: (Ref: Sabiston 19th/1118; Schwartz 9th/1313-1315; Shackelford 7th/562-565)

- “Neuropathic groin pain is caused by damage to a nerve in the groin region and may be due to partial or complete division, stretching, contusion, crushing, suturing, or electrocautery. The nerves that are usually involved are the ilioinguinal nerve, iliohypogastric nerve, both the genital and femoral branches of the genitofemoral nerve, and the lateral femoral cutaneous nerve of the thigh. The first two are especially prone to injury during an open herniorrhaphy, while the latter (i.e. Lateral cutaneous nerve of thigh) are more likely damaged during laparoscopy. The genital and femoral branches of the genitofemoral nerve and the lateral cutaneous nerve of the thigh are most at risk when the surgeon staples below the iliopubic tract when lateral to the internal spermatic vessels. A burning, tingling pain along the lateral aspect of the thigh in the distribution of the lateral femoral cutaneous nerve is known as meralgia paresthetica, and is due to entrapment of that nerve; the affected skin area may be hyperaesthetic and/or pruritic, and patients may complain of the tactile hallucination of a sensation of small insects creeping under the skin (formication).”- Schwartz 9th/1313.

39. Ans. a. Ilioinguinal nerve

FEMORAL HERNIA

40. Ans. b. Pregnancy is common cause (Ref: Sabiston 19/e p1126; Schwartz 10/e p1504, 9/e p1312, 1332; Bailey 26/e p959-961, 25/e p977-980; Shackelford 7/e p547-554)

FEMORAL HERNIA

- Femoral hernia is the 3rd MC type of primary hernia.
- Accounts for 20% of hernias in women^Q and 5% in men.
- More common in multipara^Q
- More common on right side; Bilateral in 20%^Q
 - It cannot be controlled by a truss^Q
 - Of all hernias it is the most liable to become strangulated^Q because of:
 - Narrowness of the neck of the sac^Q
 - Rigidity of the femoral ring^Q
 - Strangulation is the initial presentation of 40% of femoral hernias^Q
 - Should be operated on as soon as possible^Q

Anatomy

- Femoral canal occupies the most medial compartment of the femoral sheath and extends from femoral ring to saphenous opening^Q.
- Femoral canal is 1.25 cm long and 1.25 cm wide at its base^Q, which is directed upwards.
- Femoral canal contains fat, lymphatic vessels and lymph node of Cloquet^Q.

Boundaries of Femoral Ring

- Anteriorly by the **inguinal ligament**^Q
- Posteriorly by **Astley Cooper's (iliopectineal) ligament, pubic bone and pectineus fascia**^Q
- Medially by **Gimbernat's (lacunar) ligament**^Q, which is also prolonged along the iliopectineal line, as Astley Cooper's ligament
- Laterally by a **thin septum separating it from the femoral vein**^Q

Clinical Features

- Rare before puberty
- Prevalence rises between **20-40 years**^Q of age and this continues to old age.
- A small femoral hernia may be unnoticed by the patient or disregarded for years, perhaps **until the day it strangulates**^Q.
- Mass or bulge below and lateral to **pubic tubercle**^Q

Treatment

- **Low inguinal operation (Lockwood)**^Q
- **Inguinal operation (Lotheissen)**^Q
- **High inguinal operation (McEvedy)**^Q
- Midline Abdominal Extraperitoneal Femoral Hernioplasty (**Henry Procedure**^Q): This is now considered as the **procedure of choice**; does not damage the transversalis fascial floor; reducing the risk of a subsequent inguinal hernia.

41. Ans. d. Femoral vein

42. Ans. a. Lateral and below

43. Ans. a. Low inguinal operation

44. Ans. a. Femoral hernia

45. Ans. c. Lacunar ligament

46. Ans. d. McVay repair (Ref: Schwartz 9/e p2514)

McVay repair closes the femoral space, is effective for femoral hernia.

47. Ans. a. Cloquet's hernia (Ref: Bailey 25/e p978-979)

Variants of Femoral Hernia

Laugier's femoral hernia ^Q	<ul style="list-style-type: none"> • Hernia through a gap in the lacunar (Gimbernats) ligament • Diagnosis is based on unusual medial position of a small femoral hernia sac • Always strangulated
Narath's femoral hernia ^Q	<ul style="list-style-type: none"> • Occurs in patients with congenital dislocation of hip • Due to lateral displacement of the psoas muscle • Hernia lies hidden behind the femoral vessels
Cloquet's hernia ^Q	<ul style="list-style-type: none"> • Sac lies under the pectineus fascia

48. Ans. a. Lacunar ligament

49. Ans. a. Below and lateral to pubic tubercle

SPIGELIAN HERNIA

50. Ans. a. Usually occurs above arcuate line (Ref: Sabiston 19/e p1135; Bailey 26/e p966, 25/e p983; Schackelford 7/e p609-610)

SPIGELIAN HERNIA

- Spigelian hernia **occurs through the spigelian fascia**^Q
- Spigelian fascia is composed of **aponeurotic layer between rectus muscle medially and semilunar line laterally**^Q.

- Nearly **all spigelian hernias occur at or below the arcuate line**^Q.
- **Absence of posterior rectus fascia may contribute to an inherent weakness** in this area^Q.
- These hernias are **often interparietal**, with the hernia sac dissecting posterior to the **external oblique aponeurosis**^Q.
- Spigelian hernia sac **always penetrates the spigelian aponeurosis and usually penetrates the internal oblique musculature**^Q.

Clinical Features

- Most spigelian hernias are **small (1-2 cm in diameter)**
- Develop during **4 to 7 decades** of life.
- Patients often present with **localized pain** in the area **without a bulge** because the **hernia lies beneath the intact external oblique aponeurosis**^Q.

Diagnosis

- Ultrasound or CT of the abdomen can be **useful to establish the diagnosis**^Q.

Treatment

- A spigelian hernia is **repaired** because of the **risk for incarceration**^Q associated with its **relatively narrow neck**.
- Defect is **closed transversely by simple suture repair**^Q of the transversus abdominis and internal oblique muscles, followed by closure of the external oblique aponeurosis.
- **Larger defects** are repaired using a **mesh prosthesis**^Q.
- **Recurrence** is **uncommon**^Q.

51. Ans. b. Subumbilical region

52. Ans. b. Lateral border of rectus abdominis

53. Ans. d. Hernia occurring at the level of arcuate line

54. Ans. b. Internal oblique

SLIDING HERNIA

55. Ans. d. Sigmoid colon (Ref: Sabiston 19/e p1126; Bailey 25/e p977; Schackelford 7/e p566)

SLIDING HERNIA (HERNIA EN GLISSADE)

- Hernias in which **posterior wall of the sac is formed by a viscus**^Q
- **Viscera** is **liable to be injured** if the hernia sac is resected during surgery^Q
- **More common on left side**^Q

Most Common Content

- **Left side:** Sigmoid colon^Q and its mesentery (MC)
- **Right side:** Cecum^Q

- **Other contents:** Appendix, urinary bladder, uterus, fallopian tube, ovary or ureter
- **Primary danger:** Failure to recognize the **visceral component** of the hernia sac **before injury** to the bowel or bladder^Q.

Clinical Features

- Occurs almost exclusively in men^Q.
- **More common on the left side**^Q; rarely bilateral
- Patient is **nearly always over 40 years of age**, the incidence rising with age^Q.

- Occasionally, **large intestine is strangulated** in a sliding hernia; more often, **non-strangulated large intestine is present behind the sac containing strangulated small intestine**^Q.

Treatment

- **Operation** is indicated
- **Sliding hernia contents** are **reduced into the peritoneal cavity**, and any excess hernia sac is **ligated and divided**^Q.
- Sliding hernia is a cause of considerable discomfort, **impossible to control with a truss**^Q.

56. Ans. b. Sliding hernia

57. Ans. b. Sigmoid colon

58. Ans. b. Barium-meal (Ref: CSDT 12/e p771)

An **upper GI barium series (Barium meal)** is the preferred examination in the **investigation of sliding hiatus hernia**. In this question, sliding hernia means sliding hiatus hernia.

By the way, CSDT says "Finding a **segment of colon in the scrotum on barium enema** strongly suggests a **sliding hernia**."

59. Ans. c. Sliding hernia

LUMBAR HERNIA

60. Ans. d. More common on right side (Ref: Sabiston 19/e p1137; Schwartz 10/e p1742, 9/e p1273; Bailey 26/e p966-967, 25/e p983-984; Schackelford 7/e p613-616)

LUMBAR HERNIA

- Lumbar hernias can be either **congenital (20%)** or **acquired (80%)**^Q
- **Occur in the lumbar region** of the **posterior abdominal wall**^Q.
- **More common on left side, in men**^Q

- Hernias through the **superior lumbar triangle** (Grynfeltt's triangle) are **more common**^Q.
- Grynfeltt's triangle is bounded by the 12th rib, paraspinal muscles and internal oblique muscle^Q.

- **Less common** are hernias through the **inferior lumbar triangle** (Petit's triangle)^Q
- Petit's triangle is bounded by the iliac crest, latissimus dorsi muscle, and external oblique muscle^Q.
- **Weakness of the lumbodorsal fascia** through either of these areas results in **progressive protrusion of extraperitoneal fat** and a **hernia sac**^Q.

Clinical Features

- **MC presentation:** **Unilateral bulge** in the flank^Q.
- Lumbar hernias are **not prone to incarceration**^Q.

Treatment

- Lumbar hernia be **repaired at the time of discovery**; the exception is in **newborns** and be undertaken after a child is **6 months of age**^Q.
- **Dowd's operation** is done for **lumbar hernia**^Q.
- **Repair is best done by placement of prosthetic mesh**, which can be sutured to the margins of the hernia^Q.

OBTURATOR HERNIA

61. Ans. b. Common in female, c. Chronic constipation risk factor, d. Surgical treatment should be done, e. May present with intestinal obstruction (Ref: Sabiston 19/e p1137; Bailey 26/e p967-968, 25/e p984; Schackelford 7/e p616-618)

OBTURATOR HERNIA

- Also known as **skinny old lady hernia** or **French hernia**^Q.
- **Thin, elderly, and debilitated women** are at greatest risk
- More common in **female** secondary to the **larger and more oblique** design of the **obturator canal**^Q.
- Occur more frequently on the **right** in **female** patients and on the **left** in **male** patients^Q.
- **Bilateral** in **6%** cases.

Predisposing Factors

- | | |
|--|--|
| <ul style="list-style-type: none"> • Women with wider pelvis and more triangular obturator canal^Q • Malnutrition^Q | <ul style="list-style-type: none"> • Chronic constipation, COPD, ascites, kyphoscoliosis^Q • Multiparity^Q • Age 70-79 years^Q |
|--|--|

Clinical Features

- Patients present **most commonly with intestinal obstruction**^Q (the jejunum or ileum within the hernial sac).

Howship-Romberg Sign ^Q	<ul style="list-style-type: none"> • Pain radiating down the medial thigh to the knee due to compression of the obturator nerve (anterior division) by the hernial sac • Pathognomonic for an incarcerated hernia • Present in 25-50% cases
Hannington Kiff sign ^Q	<ul style="list-style-type: none"> • Absence of the obturator reflex in the thigh due to compression of the obturator nerve.

Treatment

- Operation is indicated
- **Posterior approach** (either open or laparoscopic) is **preferred**^Q.

62. Ans. b. Obturator hernia

PARADUODENAL HERNIA

63. Ans. d. Common on right side (Ref: Sabiston 19/e p1106; Schackelford 7/e p954-955)

PARADUODENAL HERNIA

- It is the **MC** variety of **congenital internal hernia**^Q
 - Nearly **75%** are **left-sided**, **more common in males**
- | |
|---|
| <ul style="list-style-type: none"> • Herniation into the left Paraduodenal fossa (Fossa of Landzert^Q) occurs more frequently than herniation into the right fossa (Fossa of Kolb^Q). |
|---|

- Small bowel herniate through the **vascular arch of Treitz** formed by the **inferior mesenteric vein** and the **ascending branch of left colic artery**^Q
- **Herniated bowel** is **posterior** to the **mesocolon**; with the **afferent limb** being the **4 part of the duodenum** and **efferent limb** being the **terminal ileum**^Q.

Clinical Features

- Occur between 4 to 5 decade
- **Postprandial pain with postural variation is a characteristic symptom**^Q
- Inferior mesenteric vein compression in left PDH may lead to **hemorrhoids**.
- Commonly PDH manifest as **acute intestinal obstruction**. Life time risk of **incarceration** is 50%.

Diagnosis

- On barium study the **small bowel** is **clustered** to the **left of the midline** with a well-circumscribed edge that corresponds to the hernial sac.
- However **all radiologic studies may be normal** especially in **chronic intermittent cases**, because hernia may **reduce spontaneously**. These investigations are **most often diagnostic** during an **acute episode**^Q.

Treatment

- **Reduction of hernia sac and closure of the defect**^Q or incision of the hernia sac

64. Ans. d. More common on right side

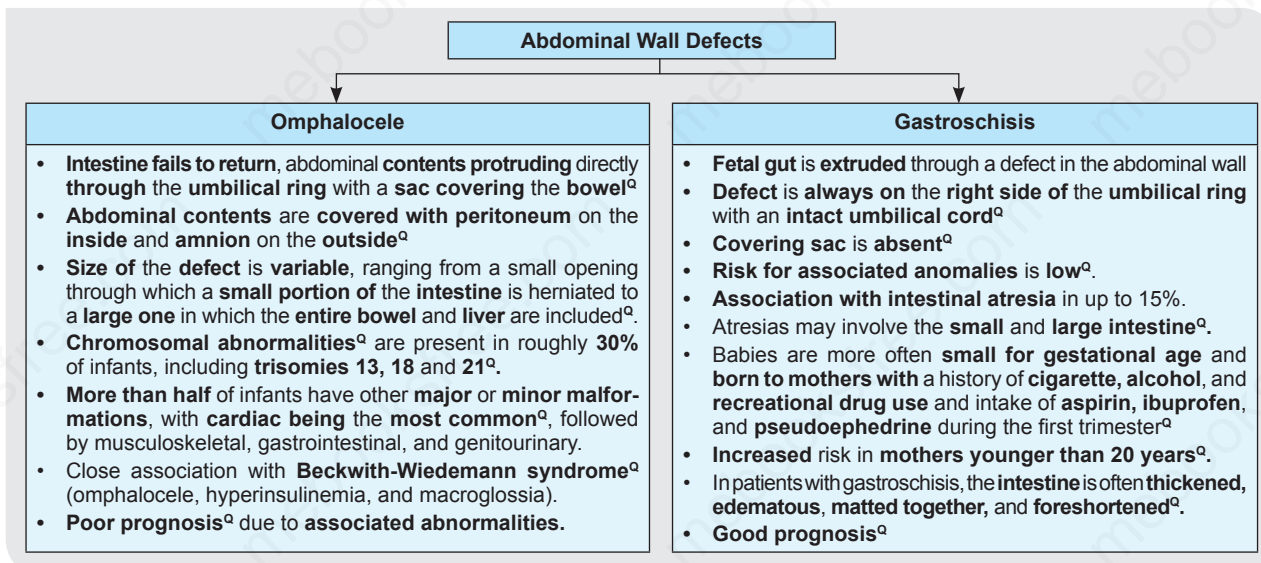
65. Ans. a. Stammer's hernia (Ref: www.ncbi.nlm.nih.gov/Ann Surg v.177(5); May 1973)

STAMMER'S HERNIA

- **Internal hernia** occurring through window in the **transverse mesocolon** after retrocolic **gastrojejunostomy** is known as Stammer's hernia^Q.
- Stammer's Hernia can lead to **colonic ischemia**

UMBILICAL HERNIA

66. Ans. b. Amniotic membrane (Ref: *Sabiston 19/e p1855-1856; Schwartz 10/e p1455,1631, 9/e p1442-1443; Bailey 26/e p121, 25/e p980-981*)



67. Ans. c. Failure of gut to return to the body cavity from the physiological herniation

68. Ans. b. 2.5 (Ref: pubmedcentralcanada.ca/e/ppmcc/articles/.../annrce01490-0010.pdf)

Moore's classification of omphalocele	
Type	Diameter of Defect
Type 1	<2.5 cm ^Q
Type 2	2.5 to 5 cm
Type 3	>5 cm

69. Ans. a. Birth (Ref: Sabiston 19/e p1855; Schwartz 10/e p1453,1631,1632, 9/e p1442-1443; Bailey 26/e p121, 25/e p980)

EXOMPHALOS (OMPHALOCELE)

- Incidence: 1 in 5000^Q live births
- Due to failure of all or part of the midgut to return to the coelom during early fetal life.
- Sac is very thin, consists an **outer layer of amniotic membrane** and **inner layer of peritoneum**^Q.

- In smaller defects a single loop of intestine may not be obvious^Q
- In large defects, the liver, spleen, stomach, pancreas, colon or bladder may be seen through the membrane.

- Intestine lies freely mobile within the intact sac^Q without evidence of adhesions or inflammation.
- In contrast, the liver has dense adhesions to the sac^Q

Treatment

- Small defects may be closed primarily soon after birth^Q.

70. Ans. d. Umbilical hernia (Ref: Sabiston 19/e p1130-1131; Schwartz 10/e p1455,1631, 9/e p1441-1442; Bailey 26/961-963, 25/e p980-981; Schackelford 7/e p599-600)

UMBILICAL HERNIA

- Umbilical hernias in infants are congenital^Q and are quite common.
- Strong predisposition in individuals of African descent.
- Close spontaneously in most cases by the age of 2 years^Q.
- Complications are unusual^Q
- Those that persist after the age of 5 years are frequently repaired surgically^Q

Indications of Surgery in Umbilical Hernia

- | | |
|--|--|
| <ul style="list-style-type: none"> • Persisting beyond 5 years^Q • Symptomatic^Q • Strangulated^Q | <ul style="list-style-type: none"> • Defect size >2 cm^Q • Progressive enlarging^Q hernia after the age 1-2 years |
|--|--|

Treatment

- Small defects: Closed primarily^Q
- Defects >3 cm: Closed using prosthetic mesh^Q.

Mayo's repair

- Vest-over-pants repair proposed by Mayo employs imbrication of superior and inferior fascial edges^Q.
- Because of increased tension on the repair and recurrence rates of 30%, it is rarely performed today^Q.

71. Ans. d. All of the above

72. Ans. b. Gastroschisis is associated with multiple anomalies

73. Ans. b. Direct inguinal hernia

74. Ans. c. 1 in 5000

75. Ans. d. A herniation of abdominal contents through the body wall

76. Ans. c. 4 cm

Omphalocele/exomphalos: Congenital herniation of abdominal contents at the umbilicus (i.e. into the umbilical cord). Occasionally divided into:

- < 4 cm — Umbilical cord hernia
- > 4 cm — Omphalocele

EPIGASTRIC HERNIA

77. Ans. b. Fatty hernia of the linea alba (Ref: Sabiston 19/e p1131; Schwartz 10/e p1455, 9/e p1273; Bailey 26/e p963, 25/e p982-983; Schackelford 7/e p597)

EPIGASTRIC HERNIA (FATTY HERNIA OF THE LINEA ALBA, EPIGASTRIC LIPOMA)

- About 3% to 5% of the population has epigastric hernias.
- More common in men^Q.
- Located between the xiphoid process and umbilicus^Q

- Multiple in up to 20% of patients, and about 80% are just off^Q the midline.

- Usually **within 5 to 6 cm of the umbilicus**.
- **Defects are small and often produce pain out of proportion** to their size owing to **incarceration of preperitoneal fat**^Q.

Clinical Features

- **Majority** of these hernias are **asymptomatic**
- Sometimes such a hernia gives rise to **attacks of local pain**. This may be because the **fatty contents become nipped sufficiently** to produce **partial strangulation**^Q.

- **Referred pain**: It is not uncommon to find that the patient, who may not have noticed the hernia, complains of **pain suggestive of a peptic ulcer**^Q.

Treatment

- Repair usually consists of **excision of the incarcerated preperitoneal tissue and simple closure of the fascial defect**^Q.

78. Ans. c. Located above the umbilicus and on either side

- Epigastric hernias are **multiple in up to 20%** of patients, and **about 80%** are **just off the midline**^Q.

RICHTER'S HERNIA

79. Ans. a. Richter's hernia (Ref: Bailey 26/e p950, 25/e p970)

RICHTER'S HERNIA

- Richter's hernia is a hernia in which the **sac contains only a portion of the circumference** of the **intestine**^Q (usually small intestine).
- It usually **complicates femoral** and, rarely, obturator hernias.

Strangulated Richter's hernia

- **Operation** is frequently **delayed** because the **clinical features mimic gastroenteritis**^Q.
- The **local signs of strangulation** are often **not obvious**^Q
- Patient may not vomit and, although colicky pain is present
- **Bowels** are often **opened normally** or there **may be diarrhea**^Q
- **Absolute constipation** is **delayed** until paralytic ileus supervenes.
- For these reasons, **gangrene of the knuckle of bowel and perforation** have often **occurred before operation** is undertaken^Q.

80. Ans. c. Involves only a portion of the circumference of the bowel

81. Ans. c. Richter's hernia

82. Ans. b. Femoral hernia

LITTRE'S HERNIA

83. Ans. b. Meckel's diverticulum (Ref: Bailey 26/e p968, 25/e p969)

84. Ans. c. Littre's hernia

LITTRE'S HERNIA

- Littre's hernia is the **protrusion of a Meckel's diverticulum**^Q through a potential abdominal opening.

MISCELLANEOUS HERNIA

85. Ans. a. In children, indirect inguinal hernia is treated medically, b. In Richter's hernia, absolute constipation seen, d. Deep inguinal ring is lateral and above the pubic tubercle (Ref: BDC 4/e pool III/e p208)

- **Surgery** is the **only treatment option for hernia in any age group**, there is no role of medical treatment.
- **Deep ring** is situated **1.25 cm above the inguinal ligament, midway between the symphysis pubis and ASIS**^Q.
- **Deep ring** is an **opening in the fascia transversalis**^Q.
- **Superficial ring** lies **immediately above the pubic tubercle**, as a **triangular gap in the external oblique aponeurosis**^Q.
- **Clinical features** mimic **gastroenteritis in strangulated Richter's hernia**^Q.

86. Ans. a. External abdominal hernia is common, b. Direct hernia usually acquired, c. (Strangulation is common in femoral hernia), d. Direct hernia is acquired in old age, e. TOC for indirect inguinal hernia is surgery
87. Ans. a. Direct hernias are usually acquired, b. Femoral is most common hernia to strangulate, c. External abdominal hernia are most common, e. Treatment of choice for indirect inguinal hernia is surgery
88. Ans. a. Absorbable sutures, c. (Missed sac), d. Infection (Ref: Bailey 25/e p977; http://www.medscape.org/viewarticle/420354_7)

RECURRENT HERNIAS

- Reported recurrence rates vary between 0.2% and 15% depending on the technique employed.
- Only 50% of recurrences will become apparent within 2 years^Q.
- Causes of recurrent inguinal hernias, especially those that appear in the first postoperative year, are usually due to errors of observation, judgment, or surgical technique^Q.

Causes of Recurrence	
<ul style="list-style-type: none"> • Failure to perform high ligation or reduce the peritoneal sac with an indirect hernia^Q • Inadequate closure of the internal ring^Q • Missed sac^Q 	<ul style="list-style-type: none"> • Metabolic problems of the tissues in the groin^Q • Infection^Q that destroys the repair • Continuing failure of the floor of the canal^Q

DUAL (SADDLE-BAG OR PANTALOON) HERNIA

- This type of hernia consists of two sacs that straddle the inferior epigastric artery, one sac being medial and the other lateral to this vessel.
- The condition is not rare and is a cause of recurrence, one of the sacs having been overlooked at the time of operation.

89. Ans. a. Gibbon's

Gibbon's hernia	• Hernia with hydrocele ^Q
Berger's hernia	• Hernia into pouch of Douglas ^Q
Beclard's hernia	• Femoral hernia through opening of saphenous vein ^Q
Amyand's hernia	• Inguinal hernia containing appendix ^Q
Ogilvie's hernia	• Hernia through the defect in conjoint tendon just lateral to where it inserts with the rectus sheath ^Q
Stammer's hernia	• Internal hernia occurring through window in the transverse mesocolon after retrocolic gastrojejunostomy ^Q
Peterson hernia	• Hernia under Roux limb after Roux-en-Y gastric bypass ^Q

90. Ans. d. Berger's

- Velpeau hernia: Hernia in front of femoral vessels
- Holthouse hernia: Inguinal hernia with extension of the loop of intestine along inguinal ligament.

91. Ans. b. Eduardo Bassini

92. Ans. a. Sliding

INCISIONAL HERNIA

93. Ans. d. Old age (Ref: Sabiston 19/e p1131-1133; Schwartz 10/e p1454-1455, 9/e p1273; Bailey 26/e p964-966; Schackelford 7/e p602-608)

Old age is a risk factor for incisional hernia, but not for wound dehiscence.

INCISIONAL HERNIA

- Postoperative ventral abdominal wall hernia or incisional hernia is the result of a failure of fascial tissues to heal and close following laparotomy^Q.
- As the approximated fascial tissue separates, the bowel and omentum herniates through the opening, covered by a peritoneal sac^Q.

- Highest incidence is seen with midline vertical incisions^Q.
- Incidence seems to be lower in smaller incisions

- Modern rates of incisional hernia range from 2-11%.
- One-third of these hernias will present 5-10 years postoperatively.

Risk Factors for Incisional Hernia		
Surgery Related	Surgeon Related	Patient Related
<ul style="list-style-type: none"> • Emergency surgery^Q • Wound infection^Q • Midline vertical incisions^Q 	<ul style="list-style-type: none"> • Wounds closed under excessive tension^Q • Poor technique^Q • Use of absorbable sutures^Q 	<ul style="list-style-type: none"> • Advanced age, malnutrition^Q • Ascites, Steroid use^Q • Diabetes, obesity^Q • Smoking, coughing^Q • Vomiting and distension^Q

Clinical Features

- **Bulge** in the abdominal wall originating deep to the skin scar.
- Symptoms **aggravated** by **coughing** or **straining** as the hernia contents protrude through the abdominal wall defect.
- In **large ventral hernias**, the **skin** may present with **ischemic** or **pressure necrosis** leading to **frank ulceration^Q**.

Treatment

- **Operative repair:** Primary **suture repair** of the hernia, **open repair** with prosthetic mesh, and **laparoscopic incisional hernia repair^Q**.

- Laparoscopic incisional hernia repair (IPOM- Intraperitoneal onlay mesh repair) has the lowest rate of recurrence^Q

- **Major complication** from **open, nonmesh incisional hernia repair: Recurrence^Q**
- **Recurrence rates** vary between **10-50%**, typically reduced by 750% with the use of prosthetic mesh
- **Risk of recurrence** is likely **related to the tension** placed on the repair in large hernias
- Incisional hernias with a **diameter >4 cm** should be **repaired with mesh^Q**.

94. Ans. a. Incisional hernia

95. Ans. d. Caused by use of local anesthesia

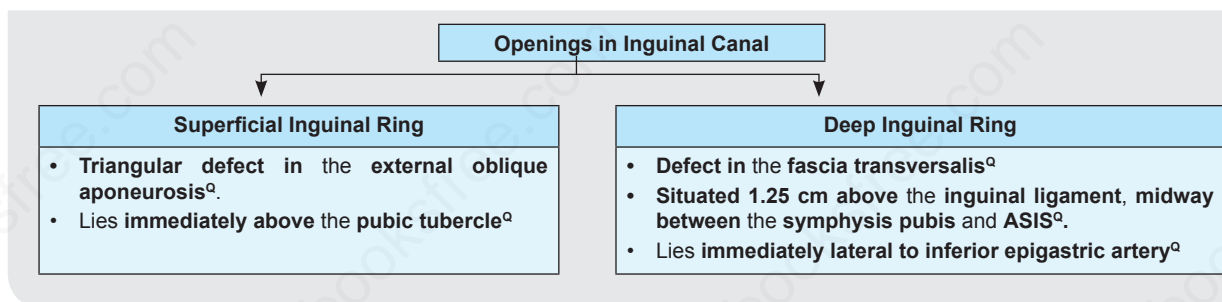
96. Ans. d. Inusional

HERNIA AND ABDOMINAL WALL ANATOMY

97. Ans. d. Ilioinguinal nerve

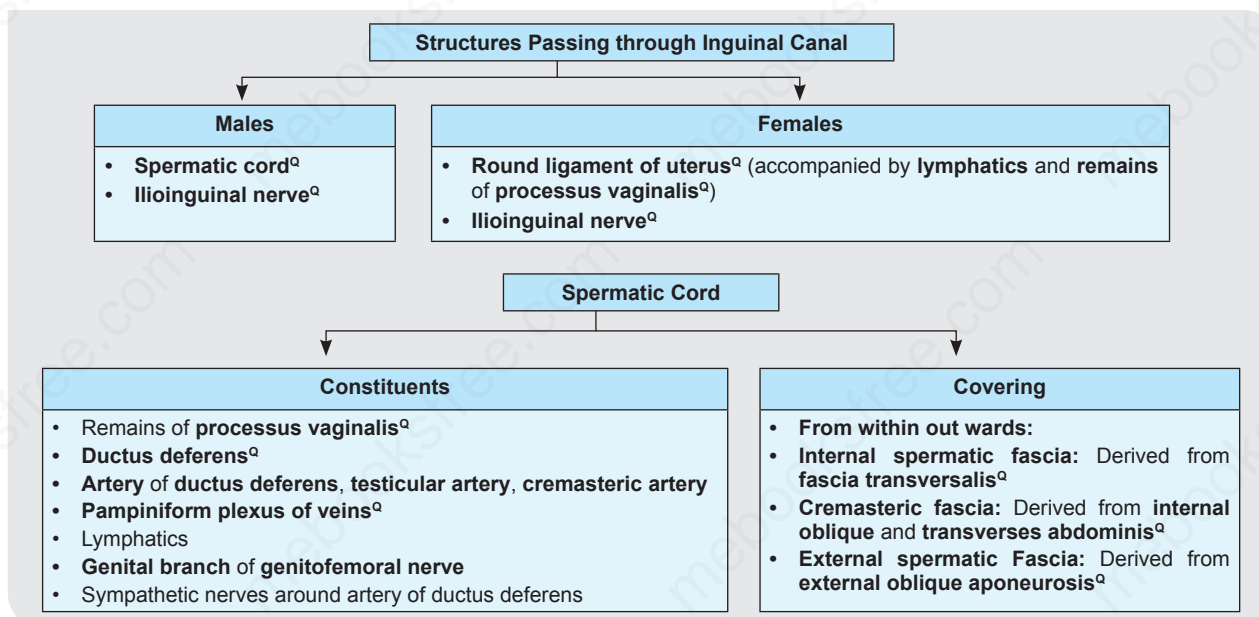
98. Ans. c. Inferior epigastric artery (Ref: BDC 4/e pvol II/e p208)

Deep ring lies immediately lateral to inferior epigastric artery, so artery is being in danger of getting damaged while releasing the constriction at the deep ring.



99. Ans. b. Incising the external oblique aponeurosis

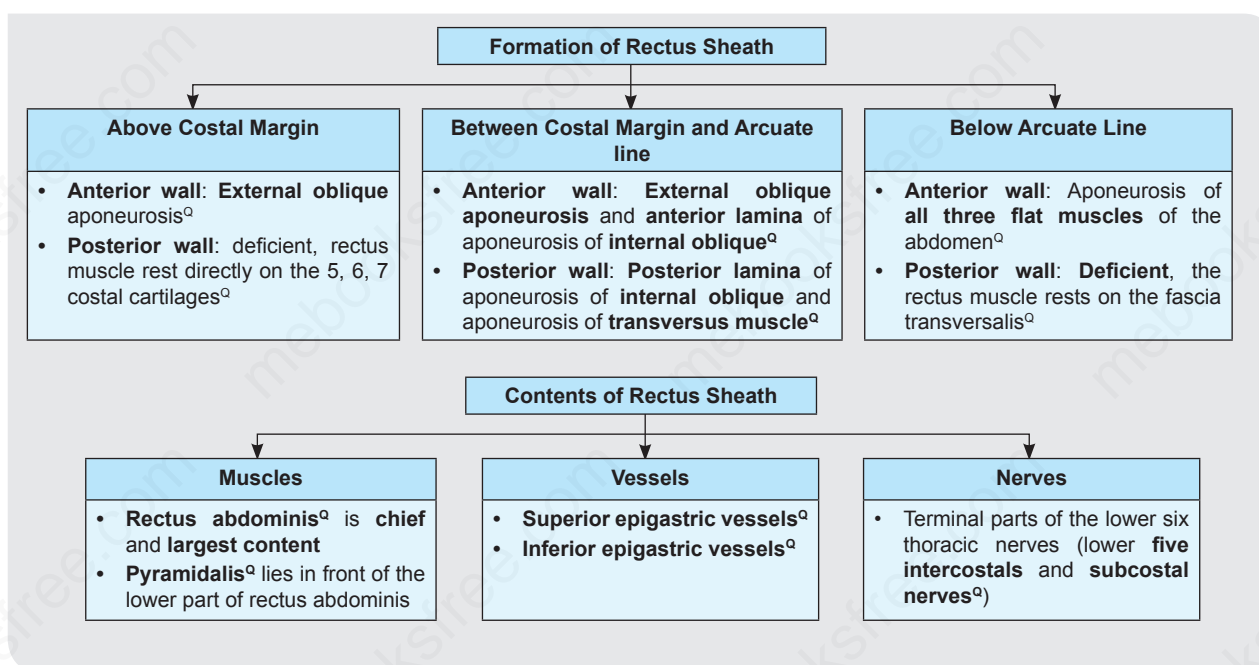
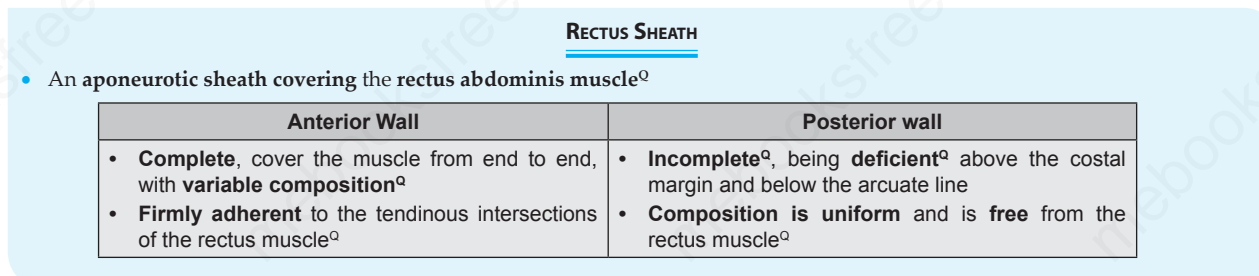
100. Ans. d. Inferior epigastric artery (Ref: BDC 5/e pvol III/e p224)



101. Ans. a. Defect in fascia transversalis

102. Ans. b Genitofemoral nerve (Ref: BDC 4/e pool-III/e p205-206)

Structure contained within rectus sheath are **rectus abdominis**, **pyramidal muscle**, **superior and inferior epigastric vessels** and terminal parts of the lower six thoracic nerves (lower **five intercostals** and **subcostal nerves^Q**).

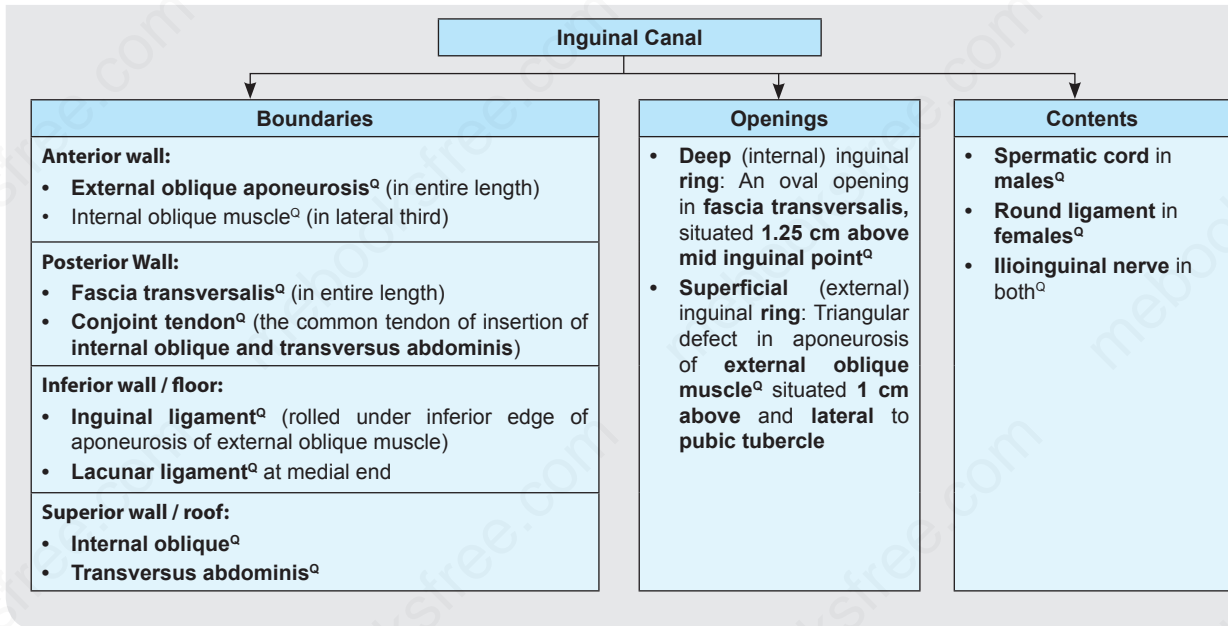


103. Ans. a. Xiphoid process

104. Ans. a. It is an intermuscular canal, b. Superficial inguinal ring is situated superior and lateral to pubic tubercles, d. In male vas deference passes through it (Ref: BDC 4/e pvol-II/e p208-209)

INGUINAL CANAL

- Inguinal canal is **4 cm long intermuscular canal**^Q, directed downward, forward and medially
- Extends from **deep inguinal ring** to **superficial inguinal ring**



105. Ans. c. Deep ring is an opening in transversalis abdominis

106. Ans. d. Lacunar ligament

CONJOINT TENDON

- Conjoint tendon is formed by **fusion of the lowest aponeurotic fibers of the internal oblique and transverses abdominis**^Q.
- It is attached to the pubic crest and to the medial part of pectin pubis.
- Medially, it is continuous with the anterior wall of rectus sheath. Laterally, it is usually free^Q.
- The conjoint tendon strengthens the abdominal wall at the site, where it is weakened by superficial inguinal ring^Q.

107. Ans. d. Transversalis fascia

108. Ans. a. Linea Alba is poorly formed, c. External oblique poorly formed

109. Ans. a. Superficial inguinal ring is an opening in external oblique aponeurosis, c. Posterior wall is formed by transversalis fascia and conjoined tendon

110. Ans. a. 1.25 cm

111. Ans. a. Pylorus of the stomach

TRANSPLYLORIC PLANE

- An upper transverse line also known as **Addison's Plane**^Q
- Located halfway between the **jugular notch** and **upper border of the pubic symphysis**^Q
- It is also said to lie roughly a hand's breadth beneath the xiphoid process of the human sternum.
- The plane in most cases **cuts through**: the
- **Pylorus of the stomach**^Q
- **Tips of the 9 costal cartilages**^Q
- **Lower border of the L1 vertebra**^Q

112. Ans. a. Poupart's ligament, b. Lacunar ligament, c. Superficial inguinal ring (Ref: BDC 4/e pvol-II/208-209)

- Inguinal ligament is also known as **Poupart's ligament**^Q.
- **Lacunar ligament** (also named **Gimbernat's ligament**) is a ligament in the inguinal region that **connects the inguinal ligament to the pectineal ligament** near the point where they both insert on the pubic tubercle^Q.
- **Cremaster muscle originates from the internal oblique muscle**^Q.

UMBILICAL ADENOMA

113. Ans. None (Ref: Bailey 26/968, 25/e p986)

UMBILICAL ADENOMA OR RASPBERRY TUMOUR

- Commonly seen in infants but only occasionally later in life^Q.
- Due to a partially (occasionally a completely) unobliterated vitellointestinal duct^Q.
- Mucosa prolapsing through the umbilicus gives rise to a raspberry-like tumour^Q
- Moist and tends to bleed

Treatment

- Pedunculated tumour: A ligature is tied around^Q it, in a few days, the polypus drops off.
- If tumour reappears after this procedure: Umbilectomy^Q

114. Ans. c. Umbilical adenoma

115. Ans. d. Congenital

DESMOID TUMOR

116. Ans. c. Surgery (Ref: Sabiston 19/e p1095; Schwartz 10/e p1485, 9/e p1299; Bailey 26/e p969, 25/e p990 Schackelford 7/e p974, 2035)

DESMOID TUMOR

- Tumor arising in the musculoaponeurotic structures of the abdominal wall, especially below the level of the umbilicus^Q.
- It is a completely unencapsulated fibroma^Q and is so hard that it creaks when it is cut^Q.
- Distribution: Extraabdominal (60%), abdominal wall (25%), intra-abdominal (15%).
- Some cases recur repeatedly in spite of apparently adequate excision^Q.
- About 80% of cases occur in women^Q, many of whom have borne children

- Occurs occasionally in scars^Q of old hernial or other abdominal operation wounds.
- Surgical trauma^Q: Important etiological factor
- Estrogens stimulate^Q desmoid growth
- Occur in cases of FAP^Q

Pathology

- Tumour is composed of fibrous tissue containing multinucleated plasmodial masses resembling foreign body giant cells^Q.
- Usually of very slow growth, it tends to infiltrate muscle in the immediate area^Q.
- Eventually it undergoes a myxomatous change and it then increases in size more rapidly.
- Metastasis does not occur^Q, no sarcomatous change^Q

Diagnosis

- MRI is investigation of choice for extremity and abdominal wall desmoids^Q.

Treatment

- Wide local excision (with 2 cm margin) is treatment of choice^Q.
- Surgery + Radiotherapy: For recurrent desmoid tumors^Q

117. Ans. e. Highly radiosensitive

118. Ans. b. Scar tissue

119. Ans. a. Surgery

120. Ans. b. Wide excision (Ref: Devita 9/e p1573)

- Devita says "In desmoid tumors, post-operative radiation is not recommended in patients with negative margins. Residual tumor from a primary lesion does not invariably lead to treatment failure and adjuvant radiation may be omitted as long as local progression would not cause significant morbidity."

121. Ans. a. Mostly females are affected

MISCELLANEOUS

122. Ans. b. 6 months of age (Ref: Bailey 26/e p968, 25/e p985)

PATENT VITELLOINTESTINAL DUCT

- The resulting umbilical fistula discharges mucus^Q and, rarely, feces.
- A patent vitellointestinal duct should be excised, together with a Meckel's diverticulum if present, preferably when the child is about 6 months^Q old.

123. Ans. d. 3-6 weeks (Ref: Bailey 26/e p968, 25/e p985)

OMPHALITIS

- Incidence of an **infected umbilicus** is much higher in **communities that do not practice aseptic severance** of the umbilical cord.
 - When the stump of the umbilical cord becomes inflamed, **antibiotic therapy** usually **localizes the inflammation**.
 - By employing warm, moist dressings, the crusts separate, giving exit to pus.
 - **Exuberant granulation tissue** requires a **touch of silver nitrate**.
 - In more serious cases, infection is liable to spread along the **defunct hypogastric arteries or umbilical vein**.
- **Jaundice in the newborn: Infection reaching the liver via the umbilical vein** may cause a stenosing intrahepatic cholangiolitis, appearing some 3-6 weeks after birth^Q.

124. Ans. a. Mucus

125. Ans. d. Herniotomy

126. Ans. b. Vicarious menstruation

127. Ans. c. Urachal fistula (Ref: Bailey 26/e p968, 25/e p986)

PATENT URACHUS

- A **patent urachus** seldom reveals itself until maturity or even old age^Q.
- This is because the **contractions of the bladder commence at the apex** of the organ and **pass towards the base**^Q.
- Because it opens into the apex of the bladder a **patent urachus** is **closed temporarily during micturition** and so the potential urinary stream from the bladder is cut off.
- Thus, the **fistula remains unobtrusive until a time when the organ is overfull**, usually due to **some form of obstruction**^Q.

Treatment

- **Remove the obstruction**^Q in the lower urinary tract.
- If the leak continues or a **cyst develops** in connection with the urachus: **Umbilectomy and excision of the urachus**^Q

128. Ans. a. Urachal fistula

129. Ans. d. Umbilical hernia

130. Ans. b. Leukocyte adhesion deficiency

- **Leukocyte adhesion deficiency** is associated with **recurrent bacterial infection** and **impaired wound healing**^Q.

131. Ans. b. Stoppa's preperitoneal repair (Ref: Recent advances in surgery 10/e p166)

STOPPA'S PREPERITONEAL REPAIR

- In **Stoppa's preperitoneal repair**, the expanding intra-abdominal pressure holds the mesh in place without suture fixation.
- According to **Pascal's law**, any additional pressure exerted upon an enclosed fluid mass is transmitted equally in all directions.
- Use of large mesh extending 3-5 cm beyond the edge of defect in all sides **utilizes Pascal's law**.

132. Ans. a. Surgery should not be done unless patient becomes symptomatic (Ref: Sabiston 19/e p1120-1126; Schwartz 10/e p1509, 9/e p1318-1331; Bailey 25/e p972-976; Shackelford 7/e p568-579)

Sabiston says "**Most surgeons recommend operation on discovery of an inguinal hernia** because the natural history of a groin hernia is that of **progressive enlargement and weakening**, with the **potential for incarceration and strangulation**."

Bailey says "The **basic operation is inguinal herniotomy**, which entails dissecting out and opening the hernial sac, reducing any content and then transfixing the neck of the sac and removing the remainder. It is employed either by itself or as the first step in a repair procedure (herniorrhaphy). By itself, it is **sufficient for the treatment of hernia in infants, adolescents and young adults**."

Non-absorbable mesh is used in hernia surgery.

Surgery can be done using laparoscopy (TEP or TAPP)

133. Ans. b. Taxis (Ref: Schwartz 9/e p1331)

IMPORTANT TOPICS**MAYDL'S HERNIA (HERNIA-IN-W)**

- Maydl's hernia is **rare**.
- The **strangulated loop of the W** lies **within the abdomen**, so **local tenderness over the hernia is not marked**^Q.
- At operation, **two comparatively normal-looking loops of intestine are present in the sac**^Q.

Relation of sac in Inguinal Hernia

- **Indirect Inguinal Hernia: Sac is anterolateral to cord structures**^Q
- **Direct Inguinal Hernia: Sac is posterior to cord structures**^Q.

Herniotomy	• Ligation of hernial sac ^Q
Herniorrhaphy	• Herniotomy with posterior wall repair using in-situ structures ^Q
Hernioplasty	• Herniotomy with strengthening of posterior wall using exogenous material like mesh ^Q

Spleen

MULTIPLE CHOICE QUESTIONS

IDIOPATHIC THROMBOCYTOPENIC PURPURA

1. Best time to give platelets in ITP, 48,000/ μ L: (ILBS 2011)
 - a. After ligation of splenic artery
 - b. Preoperatively
 - c. Postoperatively
 - d. After ligation of splenic vein
2. False about ITP: (PGI SS Dec 2005)
 - a. More common in females
 - b. Splenomegaly
 - c. Altered peripheral platelet count
 - d. Increased bone marrow megakaryocytes
3. All are true about ITP except: (JIPMER GIS 2011)
 - a. Low platelet count, normal bone marrow seen
 - b. In adults, most common in young women
 - c. Chronicity if occurs in children, common in girls
 - d. Remission occurs in 70% of cases of adult ITP
4. In the diagnosis of idiopathic thrombocytopenic purpura, one of the statements is true: (COMEDK 2006)
 - a. In the bone marrow smear, there is decreased number of megakaryocytes
 - b. In the bone marrow smear, there is increased number of megakaryocytes
 - c. Prothrombin time is prolonged
 - d. Partial thromboplastin time is prolonged
5. An evidence that splenectomy might benefit a patient with idiopathic thrombocytopenic purpura includes which of the following? (UPSC 2007)
 - a. A significant enlargement of the spleen
 - b. A high reticulocyte count
 - c. Patients age less than five years
 - d. An increase in platelet count on corticosteroid therapy
6. A patient with ITP is being planned for splenectomy. What is the best time for platelet infusion in this patient: (All India 2010, 2008)
 - a. 2 hours before surgery
 - b. At the time of skin incision
 - c. After ligating the splenic artery
 - d. Immediately after removal of spleen
7. During splenectomy in ITP, platelet infusion is given: (DPG 2008)
 - a. Immediately after ligating splenic artery
 - b. Immediately after removal of spleen

- c. After incision
- d. Next day of surgery

HYSPERSPLENISM

8. All are seen in hypersplenism except: (AIIMS GIS Dec 2011)
 - a. Anemia
 - b. Thrombocytopenia
 - c. Splenomegaly
 - d. Hypocellular bone marrow
9. Which of the following doesn't fit into definition of hypersplenism? (JIPMER GIS 2011)
 - a. Bone marrow hypoplasia
 - b. Splenomegaly
 - c. Pancytopenia
 - d. Antiplatelet antibodies
10. Hypersplenism is associated with: (PGI Dec 97)
 - a. Pancytopenia
 - b. Thrombocytopenia
 - c. Leucopenia
 - d. Polycythemia

SPLENECTOMY

11. Most common complication of splenectomy: (AIIMS GIS Dec 2011)
 - a. OPSI
 - b. Avascular necrosis of greater curvature of stomach
 - c. Pancreatitis
 - d. Atelectasis
12. In contemporary world, most common indication for splenectomy is: (DNB 2005, 2000 JIPMER GIS 2011)
 - a. Trauma
 - b. Hemolytic anemia
 - c. ITP
 - d. Infections
13. Splenectomy can be curative in all of the following except: (DNB 2007, 2005, 2003, MHSSMCET 2005)
 - a. Thalassemia
 - b. Sickle cell disease
 - c. Hereditary spherocytosis
 - d. ITP
14. Splenectomy is indicated in: (MHPGMET 2005)
 - a. Spherocytosis
 - b. Pyropoikilosis
 - c. Elliptocytosis
 - d. All

15. Splenectomy is done to tide over the acute crises of uncontrollable: (MHPGMCET 2006)

- a. ITP
- b. TTP
- c. HUS
- d. All of the above

16. Splenectomy done in: (PGI Dec 2007)

- a. ITP
- b. Aplastic anemia
- c. Hereditary spherocytosis
- d. Lymphoma
- e. CML

17. Auto splenectomy is seen in one of the following hemolytic anemias: (MHCET 2016, COMEDK 2006)

- a. Hereditary spherocytosis
- b. Sick cell anaemia
- c. Thalassemia
- d. Immuno-hemolytic anaemia

18. Vaccine for post splenectomy infection is given against all except: (MCI Sept 2009, Punjab 2007)

- a. Streptococcus pneumoniae
- b. Haemophilus influenza
- c. Neisseria meningitidis
- d. E. coli

19. All of the followings are true about OPSI except:

- a. Develops 1-5 years after splenectomy (PGI June 2009)
- b. Maximum risk is within 1 year of splenectomy
- c. Begin with headache, myalgia and fever
- d. May present with severe septic shock
- e. Usually not respond with antibiotic treatment

20. Splenectomy is indicated in: (PGI Dec 2006)

- a. Hypersplenism
- b. Hereditary spherocytosis
- c. I.T.P.
- d. G-6-PD deficiency
- e. Portal hypertension

21. Which of the following is not an absolute indication of splenectomy? (All India 2000)

- a. Splenic abscess
- b. Hereditary spherocytosis
- c. Fibrosarcoma
- d. Autoimmune hemolytic anemia

22. Splenectomy is most useful in: (All India 96)

- a. Sick cell anemia
- b. Thalassemia
- c. Hereditary spherocytosis
- d. Acquired autoimmune hemolytic anemia

23. Splenectomy is not done in: (AIIMS June 2001)

- a. Myelofibrosis
- b. Sick cell anemia
- c. Hereditary spherocytosis
- d. Splenic abscess

24. Most common infection after splenectomy is:

(PGI May 2005, June 97, AIIMS Nov 93)

- a. Anaerobic
- b. Staphylococcal
- c. Streptococcal
- d. Pneumococcal

25. Most common complication of splenectomy is:

(AIIMS Nov 93)

- a. Hematemesis
- b. Left lower lobe atelectasis
- c. Peritoneal effusion
- d. Acute dilatation of stomach

26. Most common complication after splenectomy is:

(AIIMS June 94)

- a. Chest infection
- b. Hematemesis
- c. Subphrenic collection
- d. Acute dilation of stomach

27. In which case pneumococcal vaccine is most effective?

(AIIMS Nov 97)

- a. When given preoperatively
- b. When given post operatively
- c. Against all strains of bacteria
- d. Against gram negative bacteria

28. Postsplenectomy sepsis is common in: (PGI June 2000)

- a. ITP
- b. Thalassemia
- c. Hereditary spherocytosis
- d. Trauma

29. Which is the commonest postsplenectomy infection?

(DNB 2003, 2002, 2001, All India 2000, AIIMS Nov 99;

NEET 2013)

- a. Streptococcus pyogenes
- b. Staphylococcus aureus
- c. Streptococcus pneumoniae
- d. Pseudomonas aeruginosa

30. Most common complication of splenectomy is: (AIIMS 92)

- a. Pancreatic leak
- b. Pulmonary complications
- c. Pneumococcal peritonitis
- d. Hemorrhage

31. Splenectomy is least useful in:

(All India 89)

- a. Congenital elliptocytosis
- b. Thalassemia major
- c. Congenital spherocytic anaemia
- d. Hereditary nonspherocytic hemolytic anaemia

32. Splenectomy is indicated in:

(AIIMS 87)

- a. Sick cell anemia
- b. Hereditary spherocytosis
- c. Hemoglobin C disease
- d. Hodgkin's lymphoma

33. Most common infections after splenectomy are: (DPG 2010)

- a. Capsulated bacteria
- b. Uncapsulated bacteria
- c. Gram-positive sepsis
- d. Gram-negative bacteria

34. Splenectomy can lead to:

(DNB 2012, MCI Sept 2005)

- a. Leucopenia
- b. Thrombocytosis
- c. Thrombocytopenia
- d. Thrombocytopenia and leucopenia

35. Indications of splenectomy are all except: (MCI March 2007)

- a. Hereditary spherocytosis
- b. Trauma
- c. Polycythemia
- d. Idiopathic thrombocytopenic purpura

36. Splenectomy is useful in:

(MCI Sept 2008)

- a. Hemophilia
- b. Polycythemia
- c. Hereditary spherocytosis
- d. Thalassemia

37. In a female who had Steroid Resistant ITP it was decided to perform splenectomy. On day 3 post laparoscopic surgery patient had fever. Which of the following scenarios is most likely? (AIIMS May 2015)

- a. Left lower lobe consolidation
- b. Port site infection
- c. Intra-abdominal collection
- d. Urine for pus should be sent

SPLENIC TRAUMA

38. The innovative method for treatment of moderate splenic injury: (Recent Question 2014, MHSSMCET 2006)

- a. Conservative management
- b. Mesh repair
- c. Splenorrhaphy
- d. Splenectomy

39. Kehr sign is seen in:

Recent Question 2014, MHSSMCET 2009, AIIMS June 94

- a. Splenic injury
- b. Liver injury
- c. Renal injury
- d. Mesenteric hematoma

40. Management of grade 3 splenic trauma in a stable child:

(PGI Nov 2010)

- a. Embolization
- b. Partial splenectomy
- c. Total splenectomy
- d. Conservative

41. True about blunt abdominal trauma with splenic rupture:

(PGI June 2008)

- a. Kehr's sign-discoloration around umbilicus
- b. Spleen is most common organ to be involved
- c. Splenectomy is treatment of choice for splenic rupture
- d. Cullen's sign seen

42. Kehr's sign seen in splenic rupture is:

(AIIMS Nov 93, All India 95)

- a. Pain over left shoulder
- b. Pain over right scapula
- c. Periumbilical pain
- d. Pain over renal angle

43. In splenic injury, conservative management is done in:

(AIIMS JUNE 99)

- a. Hemodynamically unstable
- b. Young patient
- c. Shattered spleen
- d. Extreme pallor and hypotension

44. The most important radiological sign of splenic rupture is:

(Bihar PG 2014)

- a. Obliteration of psoas shadow
- b. Obliteration of splenic shadow
- c. Indentation of the left side air bubble
- d. Fracture of one or more lower ribs on left side

45. Accidental small splenic rupture is treated with:

(PGI 88)

- a. Catgut sutures
- b. Silk sutures
- c. Omental patch
- d. Catgut suturing with omental patch
- e. Splenectomy

46. Positive Kehr's sign is:

(MAHE 2006)

- a. Hemoperitoneum
- b. Acute cholecystitis
- c. Acute pancreatitis
- d. Amoebic abscess

47. In a patient presenting with abdominal trauma, fracture rib and bruise over left hypochondrium probable diagnosis is:

(PGI 96)

- a. Rupture left lobe of liver
- b. Rupture right lobe of liver
- c. Splenic rupture
- d. Rupture stomach

48. All of the following are true regarding splenic-rupture except:

(MCI Sept 2009)

- a. Elevation of the left dome of diaphragm
- b. Obliterated psoas shadow
- c. Obliterated colonic gas shadow
- d. Obliterated splenic outline

49. A 27-years old patient presented with left sided abdominal pain to the emergency room; 6 hours after an RTA. He was hemodynamically stable and FAST positive. A CECT (contrast enhanced CT) scan showed grade III splenic laceration. What will be the most appropriate treatment?

(All India 2010)

- a. Splenectomy
- b. Splenorrhaphy
- c. Splenic artery embolization
- d. Conservative management

50. A 27-years old patient presented with left sided abdominal pain to the emergency room, 6 hours after an ART. He is hemodynamically stable and FAST positive. A CECT (contrast enhanced CT) scan shows a contrast blush along with a grade III laceration. What will be the most appropriate management?

(All India 2010)

- a. Splenectomy
- b. Splenorrhaphy
- c. Splenic artery embolization
- d. Conservative management

SPLENIC TUMORS

51. Most common tumor of spleen is:

(All India 2000)

- a. Lymphoma
- b. Sarcoma
- c. Hemangioma
- d. Metastasis

52. Most common malignancy affecting spleen is:

(UPSC 2008, PGI June 97)

- a. Angiosarcoma
- b. Hamartoma
- c. Secondaries
- d. Lymphoma

53. Most common cause of isolated splenic metastasis is:

(All India 2012)

- a. Carcinoma pancreas
- b. Carcinoma stomach
- c. Carcinoma ovary
- d. Carcinoma cervix

54. True regarding hemangioma of the spleen:

(MCI March 2005)

- a. Least common benign tumour of the spleen
- b. May transforms into a haemangiosarcoma
- c. Malignant transformation may be managed conservatively
- d. None of the above

SPLENIC ABSCESS

55. A patient presents with fever for 3 weeks. On examination he is observed to have splenomegaly. Ultrasonography reveals a hypoechoic shadow in spleen near the hilum. Gram-negative bacilli are isolated on blood culture. Which of the following is the most likely causative organism?

(All India 2010)

- a. Cytomegalovirus
- b. Toxoplasmosis
- c. Salmonella
- d. Lymphoma virus

SPLENIC CYST

56. Most common cysts of the spleen are:

(All India 2010)

- a. Hydatid cyst
- b. Dermoid cyst
- c. Pseudocyst
- d. Lymphangioma

ACCESSORY SPLEEN

57. Most common site of accessory spleen: (AIIMS GIS Dec 2011)

- a. Gastrocolic ligament
- b. Gastrosplenic ligament
- c. Splenic hilum
- d. Splenorenal ligament

58. Commonest site of accessory spleen is:

(DNB 2012, AIIMS Nov 93)

- a. Lienorenal ligament
- b. Hilum of spleen
- c. Gastro splenic ligament
- d. Around tail of pancreas

59. Spleneculi are seen in:

(PGI June 95)

- a. Colon
- b. Hilum
- c. Liver
- d. Lungs

60. Accessory spleen is found at all sites, except:

(AIIMS 1994)

- a. Hilum
- b. Presacral area
- c. Tail of pancreas
- d. Greater omentum, small bowel mesentery

61. Spleniculi are most commonly found in: (UPPG 2009, Orissa 2011)

- a. Splenic hilum
- b. Tail of pancreas
- c. Greater omentum
- d. Gastrocolic ligament

62. Spleniculi are commonly seen in: (UPPG 2009)

- a. Hilum of spleen
- b. Tail of spleen
- c. Mesocolon
- d. Splenic ligaments

MISCELLANEOUS

63. Splenic vein thrombosis is best treated by: (USPC 97)

- a. Splenectomy
- b. Porto-caval shunt
- c. Spleno-renal shunt
- d. Mesenterico-caval shunt

64. The spleen contains about % of the total blood volume: (PGI 85)

- a. 1
- b. 2
- c. 5
- d. 7

65. Splenosis means: (PGI 79, AIIMS 85)

- a. Infection of spleen
- b. Presence of accessory spleens
- c. Rupture of spleen and distribution of its tissue on peritoneum
- d. Non-functioning spleen

66. One of the following does not cause increase in the size of spleen in later stages: (MAHE 2001)

- a. Sickle cell anemia
- b. Cirrhosis
- c. Infectious mononucleosis
- d. Hairy cell leukemia

67. Removal of senescent RBC from circulation by spleen is called: (PGI 79, JIPMER 80)

- a. Culling
- b. Pitting
- c. Filtering
- d. Phagocytosis

68. Downward displacement of enlarged spleen is prevented by: (All India 98)

- a. Lienorenal ligament
- b. Phrenicolic ligament
- c. Upper pole of right kidney
- d. Sigmoid colon

69. Regarding spleen, true is: (AIIMS 91)

- a. Arises from ventral mesogastrium
- b. Inferior border is notched
- c. Axis of spleen lies along 9th rib
- d. Derives its nerve supply from celiac plexus

70. Right sided isomerism is associated with: (All India 2011)

- a. Asplenia
- b. One spleen
- c. Two spleens
- d. Polysplenia

71. Splenic vein thrombosis is most commonly caused by: (MHPGMCET 2001)

- a. Chronic pancreatitis
- b. Carcinoma pancreas
- c. Spleen trauma
- d. Perforation of duodenum

72. Tropical splenomegaly is caused by: (MHPGMCET 2009)

- a. Malaria
- b. Kala-azar
- c. Schistosomiasis
- d. All of the above

73. Most common splanchnic aneurysm: (AIIMS GIS 2003)

- a. Splenic artery
- b. Hepatic artery
- c. Gastroduodenal artery
- d. Superior mesenteric artery

EXPLANATIONS

IDIOPATHIC THROMBOCYTOPENIC PURPURA

1. Ans. a. After ligation of splenic artery (Ref: Sabiston 19/e p1550-1552; Schwartz 10/e p90, 9/e p1253; Bailey 26/e p1092, 25/e p1106; Shackelford 7/e p1659-1661)

IDIOPATHIC THROMBOCYTOPENIC PURPURA (ITP)

- ITP is characterized by a **low platelet count** despite **normal bone marrow** and the **absence of other causes of thrombocytopenia**^Q.
- ITP is **predominantly a disease of young women**^Q
- ITP manifests differently in children: **Both genders are affected equally**^Q, onset is **sudden**, **thrombocytopenia is severe**, and **complete spontaneous remissions** are seen in **80% of affected children**^Q.
- Girls >10 years with **more chronic purpura** are those in whom the **disease seems to persist**^Q.

Pathology

- Autoantibodies** are responsible for the **disordered platelet destruction** mediated by the **overactivated platelet phagocytosis** within the **reticuloendothelial system**^Q.
- Relative bone marrow failure**^Q (production cannot match destruction of thrombocytes to compensate sufficiently).

Clinical Features

- Typical presentation:** **Purpura**, **epistaxis**, and **gingival bleeding**^Q.
- Less commonly, **gastrointestinal bleeding** and **hematuria** are noted.

- Despite the destruction of platelets by splenic macrophages, **spleen is normally not enlarged in ITP**^Q.

Diagnosis

- The **diagnosis of ITP** involves **exclusion of other relatively common causes of thrombocytopenia:** **pregnancy**, **drug-induced thrombocytopenia** (e.g., **heparin**, **quinidine**, **quinine**, **sulfonamides**), **viral infections**, and **hypersplenism**^Q

Treatment of ITP	
Asymptomatic patients with platelet counts >50,000/mm³	Observation ^Q
Platelet counts 30,000-50,000/mm³	Observation with more routine follow-up ^Q
Symptomatic patients with platelets counts <50,000/mm³ or platelet counts <30,000/mm³	Glucocorticoid (prednisone, 1 mg/kg body weight/day) ^Q
Platelets counts <20,000/mm³ with significant mucous membrane bleeding or life-threatening hemorrhage	Hospitalization ^Q

- Platelet transfusion** is indicated only for those who experience **severe hemorrhage**.
- IV immunoglobulin** is important for the **treatment of acute bleeding**, **in pregnancy**, or for **patients being prepared for operation**, including **splenectomy**.
- Other treatment options: **Long-term glucocorticoid therapy**, **azathioprine** or **cyclophosphamide**.

- Indications of splenectomy in ITP:**
 - Failure of medical therapy**^Q
 - Prolonged use of steroids with undesirable effects**^Q
 - Most cases of first relapse**^Q
- Splenectomy** provides a **permanent response** without subsequent need for steroids in **75-85% of patients**^Q.
- Laparoscopic splenectomy**^Q has become the **gold standard for ITP patients**.
- Responses** usually occur **within the first postoperative week**.
- For patients with **extremely low platelet counts (<10,000/mm³)** **platelets should be available for surgery** but should **not be given preoperatively**.
- Once the splenic artery is ligated**^Q, **platelets are given** to those who continue to bleed.

2. Ans. b. Splenomegaly

3. Ans. d. Remission occurs in 70% cases of adult ITP

4. Ans. b. In the bone marrow smear, there is increased number of megakaryocytes

IDIOPATHIC THROMBOCYTOPENIC PURPURA (ITP)

- In ITP, **platelets are coated with autoantibodies to platelet membrane antigens**, resulting in **splenic sequestration and phagocytosis by mononuclear macrophages**^Q.
- The resulting **shortened life span of platelets** in the circulation, together with **incomplete compensation by increased platelet production by bone marrow megakaryocytes**, results in a **decreased platelet count**^Q.

5. Ans. d. An increase in platelet count on corticosteroid therapy
6. Ans. c. After ligating the splenic artery
7. Ans. a. Immediately after ligating splenic artery

HYPERSPLENISM

8. Ans. d. Hypocellular bone marrow (Ref: Sabiston 19/e p1553-1554; Schwartz 10/e p1427, 9/e p1248; Bailey 26/e p1090, 25/e p1104; Shackelford 7/e p1614, 1631)

HYPERSPLENISM

- Characterized by **splenic enlargement**, any combination of **anemia, leucopenia or thrombocytopenia, compensatory bone marrow hyperplasia and improvement after splenectomy**^Q.
- Careful clinical judgment is required to balance the long- and short-term risks of splenectomy against continued conservative management.

9. Ans. a. Bone marrow hypoplasia
10. Ans. a. Pancytopenia, b. Thrombocytopenia, c. Leucopenia

SPLENECTOMY

11. Ans. d. Atelectasis (Ref: Sabiston 19/e p1558-1559; Schwartz 10/e p1429-1445, 9/e p1260-1262; Bailey 26/e p1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)

Complications of Splenectomy	
Pulmonary Complications: <ul style="list-style-type: none"> • Left lower lobe atelectasis: MC complication^Q • Pleural effusion • Pneumonia 	Thromboembolic Complications: <ul style="list-style-type: none"> • DVT • Portal vein thrombosis
Hemorrhagic Complications: <ul style="list-style-type: none"> • Subphrenic hematoma 	<ul style="list-style-type: none"> • DVT prophylaxis is routinely recommended^Q. • In patients with hemolytic anemia or myeloproliferative disorders and splenomegaly, thrombotic risk is heightened, particularly the risk of portal vein thrombosis^Q. • Patients undergoing splenectomy for malignancy or myeloproliferative disorders should be strongly considered for perioperative pharmacoprophylaxis, either LMWH or unfractionated heparin^Q.
Infectious Complications: <ul style="list-style-type: none"> • Subphrenic abscess • Wound infection 	
Pancreatic Complications: <ul style="list-style-type: none"> • Pancreatitis • Pseudocyst • Pancreatic fistula 	

12. Ans. a. Trauma (Ref: Sabiston 19/e p1550-1556; Schwartz 10/e p206-207, 9/e p1250; Bailey 26/e p1095, 25/e p1104-1108; Shackelford 7/e p1659-1670; CSDT 11/e p655)

Overall, the **most common indication for splenectomy** is **trauma** to the **spleen**, whether external trauma (blunt or penetrating) or iatrogenic injury (e.g. during operative procedures for other reasons).

- MC indication for splenectomy: Trauma^Q
- MC indication for elective splenectomy: ITP^Q

Indications for Splenectomy	
Splenectomy always indicated: <ul style="list-style-type: none"> • Primary splenic tumor^Q • Hereditary spherocytosis^Q 	Splenectomy rarely indicated: <ul style="list-style-type: none"> • Chronic leukemia • Splenic lymphoma
Splenectomy usually indicated: <ul style="list-style-type: none"> • Primary hypersplenism^Q • Chronic ITP^Q • Splenic vein thrombosis causing gastric varices^Q • Splenic abscess^Q 	<ul style="list-style-type: none"> • Macroglobulinemia • Thalassemia major • Sickle cell disease • Congestive splenomegaly and hypersplenism due to PHT • Felty's syndrome • Hairy cell leukemia • Chediak-Higashi syndrome • Sarcoidosis

Indications for Splenectomy	
Splenectomy sometimes indicated: <ul style="list-style-type: none"> • Splenic injury^a • Autoimmune hemolytic disease^a • Elliptocytosis with hemolysis • Nonspherocytic hemolytic anemia • Hodgkin's disease (for staging^a) • Thrombotic thrombocytopenic purpura^a • Idiopathic myelofibrosis^a • Splenic artery aneurysm^a • Wiscott-Aldrich syndrome • Gaucher's disease • Mastocytosis (aggressive disease) 	Splenectomy not indicated: <ul style="list-style-type: none"> • Asymptomatic hypersplenism • Splenomegaly with infection • Splenomegaly associated with elevated IgM • Hereditary hemolytic anemia of moderate degree • Acute leukemia • Agranulocytosis

13. Ans. b. Sickle cell disease

Splenectomy is not curative in sickle cell disease.

14. Ans. d. All

15. Ans. a. ITP

16. Ans. a. ITP, b. Aplastic anemia, c. Hereditary spherocytosis, d. Lymphoma, e. CML

17. Ans. b. Sickle cell anemia

Autosplenectomy	Sickle cell anemia ^a
Autonephrectomy	Renal TB ^a

18. Ans. d. *E. coli* (Ref: Sabiston 19/e p1558-1560; Schwartz 10/e p1429-1445, 9/e p1261-1263; Bailey 26/e p1094-1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)

SPLENECTOMY

- Most serious sequela is overwhelming postsplenectomy infection (OPSI), with meningitis, pneumonia, or bacteremia.

- Older studies have demonstrated that the risk of OPSI is greatest within the first 2 years after splenectomy but recent studies have confirmed that a **lifelong risk remains^o**.
- **One third of cases occur more than 5 years after surgery**, with the overall incidence reported to be 3.2% to 3.5%.
- For those who acquire OPSI, mortality is between 40-50%^o.
- Risk is greatest in patients with **thalassemia major** and **sickle cell disease^o**.

- OPSI is typically caused by polysaccharide-encapsulated organisms, such as *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Hemophilus influenzae^o*.

- When elective splenectomy is planned, **vaccination against encapsulated bacteria should be given at least 2 weeks before surgery^o**.
- If spleen is removed in **emergency**, vaccination should be given as **soon as possible^o** following surgery.

- Vaccines should be given for *Streptococcus pneumoniae*, *Hemophilus influenzae type b* and *Meningococcus^o*.
- In addition to above given 3 vaccines, **annual influenza immunization^o** is also advised as influenza has been implicated as a risk factor for secondary bacterial infections.
- **Booster injection of pneumococcal vaccine** should be given **every 5-6 years^o**.
- Harrison says that "**Routine chemoprophylaxis with oral penicillin** can result in the **emergence of drug-resistant strains** and is **not recommended.**"

Splenectomy Outcomes	
Increased risk of infections	Hematologic outcomes
<ul style="list-style-type: none"> • Life threatening infection in asplenic patients is attributable to loss of splenic macrophages, diminished tuftsin production, and loss of spleen's reticuloendothelial screening function. • After splenectomy, ability to filter and phagocytose bacteria, particularly encapsulated bacteria (<i>Streptococcus pneumoniae</i>, <i>Hemophilus influenzae</i>, <i>Neisseria meningitidis</i>) and parasitized blood cells is lost^a. • MC infection after splenectomy: <i>Streptococcus pneumoniae^a</i> (50-90% cases) 	<ul style="list-style-type: none"> • Immediately after splenectomy: <ul style="list-style-type: none"> - Leucocytosis^a - Thrombocytosis (these levels returns to normal within 2-3 weeks^a) • Chronic manifestations: <ul style="list-style-type: none"> - Anisocytosis and poikilocytosis^a - Howell jolly bodies^a (nuclear remnants) - Heinz bodies^a (denatured hemoglobin) - Basophilic stippling^a and occasional nucleated erythrocytes

Splenectomy Outcomes	
Increased risk of infections	Hematologic outcomes
Other common bacterial infections <ul style="list-style-type: none"> • Hemophilus influenzae type b^Q • Meningococcus^Q • Group A and B streptococcus^Q • <i>Capnocytophaga canimorsus</i> • <i>Enterococcus</i> species • <i>Bacteroides</i> • <i>Salmonella</i> • <i>Bartonella</i> 	
Protozoal that invade the RBCs <ul style="list-style-type: none"> • Babesia, Ehrlichia, Plasmodium (BEP)^Q 	

19. Ans. b. Maximum risk is within 1 year of splenectomy (Ref: Sabiston 19/e p1559; Schwartz 9/e p1262; Bailey 26/e p1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)

Infection may occur at any time after splenectomy; in one recent series, most infections occurred more than 2 years after splenectomy and 42% occurred more than 5 years after splenectomy.

OVERWHELMING POSTSPLENECTOMY INFECTION (OPSI)

- OPSI is the MC fatal late complication of splenectomy.

- Infection may occur at any time after splenectomy^Q
- In one recent series, most infections occurred more than 2 years after splenectomy and 42% occurred more than 5 years after splenectomy^Q.

Clinical Features

- OPSI typically begins with a prodromal phase characterized by fever, rigors and chills and other nonspecific symptoms, including sore throat, malaise, myalgias, diarrhea, and vomiting.
- Many patients have no identifiable focal site of infection and present only with high-grade primary bacteremia.

- Progression of the illness is rapid, with the development of hypotension, disseminated intravascular coagulation, respiratory distress, coma, and death within hours of presentation^Q.
- Despite antibiotics and intensive care, the mortality rate is between 50-70% for florid OPSI^Q.

Most frequently involved organism in OPSI is *S. pneumoniae*^Q (50-90% of cases)

- Other organisms involved in OPSI: *H. influenzae*, *N. meningitidis*, *Streptococcus* and *Salmonella spp*^Q.

- Risk for OPSI is greater in splenectomy for malignancy or hematologic conditions than for those who underwent splenectomy for trauma^Q.
- Risk is greater for young children^Q (<4 years of age).

20. Ans. a. Hypersplenism, b. Hereditary spherocytosis, c. I.T.P., e. Portal hypertension

21. Ans. d. Autoimmune hemolytic anemia

22. Ans. c. Hereditary spherocytosis (Ref: Sabiston 19/e p1552-1553; Schwartz 10/e p1429,1431, 9/e p1250-1251; Bailey 26/e p1092-1093, 25/e p1106-1107; Shackelford 7/e p1662)

HEREDITARY SPHEROCYTOSIS

- Autosomal dominant disease affecting the production of spectrin, a red blood cell cytoskeletal protein^Q.

Pathology

- Autosomal dominant disease affecting the production of spectrin, a red blood cell cytoskeletal protein^Q.

Loss of spectrin^Q → RBCs lack biconcave shape^Q → Affects RBCs deformability^Q → Increased osmotic fragility^Q → More susceptible to trapping and destruction by the spleen^Q.

Clinical Features

- Anemia, occasionally with jaundice, and splenomegaly^Q.

- Diagnosis is made by examination of a **peripheral blood smear**, **increased reticulocyte count**, **increased osmotic fragility**, and a **negative Coombs' test**^o.

Treatment

- **Anemia** can be **successfully treated with splenectomy**^Q
- **Splenectomy** should be **delayed until the age of 5 years** to **preserve immunologic function** of the **spleen** and **reduce the risk of OPSI**^Q.
- Presence of **pigmented gallstones**: **Cholecystectomy**^Q

23. Ans. None 24. Ans. d. Pneumococcal 25. Ans. b. Left lower lobe atelectasis
26. Ans. a. Chest infection 27. Ans. a. When given preoperatively

- When elective splenectomy is planned, **vaccination against encapsulated bacteria** should be given **at least 2 weeks before surgery**.
- If spleen is removed in **emergency**, **vaccination** should be given **as soon as possible** following surgery.

28. Ans. a. ITP, b. Thalassemia, c. Hereditary spherocytosis
29. Ans. c. Streptococcus pneumoniae 30. Ans. b. Pulmonary complications 31. Ans. b. Thalassemia major
32. Ans. a. Sickle cell anemia, b. Hereditary spherocytosis, d. Hodgkin's lymphoma
33. Ans. a. Capsulated bacteria 34. Ans. b. Thrombocytosis
35. Ans. c. Polycythemia 36. Ans. c. Hereditary spherocytosis
37. Ans. a. Left lower lobe consolidation (Ref. Sabiston 19th/1558-1559; Schwartz 9th/1260-1262; Bailey 26th/1096, 25th/1109-1110; Shackelford 7th/1674-1676)

Fever on post-operative day 3 after laparoscopic splenectomy suggests left lower lobe consolidation.

"Left lower lobe atelectasis is the most common complication after OS; pleural effusion and pneumonia also can occur. Hemorrhage can occur intra-operatively or postoperatively, presenting as subphrenic hematoma. Transfusions have become less common since the advent of LS, although the indication for operation influences the likelihood of transfusion as well. Subphrenic abscess and wound infection are among the perioperative infectious complications." - Schwartz 9th/1260

SPLENIC TRAUMA

38. Ans. a. Conservative management (Ref: Sabiston 19/e p457-459; Schwartz 10/e p206, 9/e p152-155; Shackelford 7/e p1638)

The innovative method for treatment of moderate splenic injury is conservative management.

SPLENORRHAPHY

- **Splenorrhaphy** represents a variety of “**spleen-sparing**” techniques aimed at **controlling the hemorrhage from a splenic injury** while sparing the patient the long-term immunologic consequences of splenectomy.

- Splenorrhaphy is most appropriately considered in cases of **less severe splenic injury** (e.g., grades I and II, and occasionally grade III) ^Q.
- Splenorrhaphy **should not be attempted** to repair **extensive or complex shatter or crush-type injuries** of the spleen, **nor** is it well-advised to undertake splenorrhaphy **in the face of multiple concomitant traumatic injuries or associated hypotension** ^Q.

- The placement of a **simple monofilament suture** through the **splenic parenchyma** (often in a mattress technique and incorporating a **piece of Gelfoam** or an **omental patch** placed at the site of bleeding) will often **bring** about **satisfactory hemostasis**^Q.
- **Wrapping the entire spleen** with either **absorbable** or **nonabsorbable mesh**^Q has been described as a means of **effecting external tamponade** and **controlling bleeding** and has not been associated with significantly increased risk of infectious complications.

- 39. Ans. a. Splenic injury** (Ref: Sabiston 19/e p458; Shackelford 7/e p1636)

Kehr's sign^q	<ul style="list-style-type: none"> • Pain may be referred to tip of left shoulder in splenic rupture (Kehr's sign)^q • Due to irritation of undersurface of diaphragm with blood and pain is referred to the shoulder through the affected fibers of phrenic nerve (C4 and C5^q) • Kehr's sign can be elicited by bimanual compression of the left upper quadrant^q after the patient has been in Trendelenberg's position for about 10 minutes prior to maneuver.
Ballance's sign^q	<ul style="list-style-type: none"> • A fixed area of percussible dullness in the left upper quadrant due to coagulation of blood from the injured spleen^q.

40. Ans. d. Conservative (Ref: Sabiston 19/e p457-459; Schwartz 10/e p206, 9/e p152-155; Bailey 26/e p1090, 25/e p348; Shackelford 7/e p1636-1639)

SPLenic INJURIES

- MC organ injured in blunt trauma abdomen: Spleen^Q

Pathophysiology

- Direct compression^Q of the organ in the left upper quadrant of the abdomen
- Deceleration mechanism that tears the splenic capsule or parenchyma^Q, mainly at areas fixed or tethered to the retroperitoneum

Diagnosis

- Identification of splenic injuries may occur during laparotomy in unstable patients taken emergently to the operating room^Q.
- Unstable patients with intra-abdominal fluid on FAST require exploration, with the spleen commonly being the bleeding intra-abdominal organ^Q.

- In stable patients, abdominal CT performed with IV contrast is the mainstay for diagnosing and characterizing splenic injuries^Q.
- Images are typically obtained with the contrast in the portal venous phase to enhance the splenic parenchyma maximally while still being able to visualize the vasculature.
- Splenic injuries appear as disruptions in the normal splenic parenchyma, frequently with surrounding hematoma and free intra-abdominal blood^Q.
- Occasionally, active extravasation of contrast, identified as a high-density blush, can be identified, contained within a pseudoaneurysm or bleeding into the peritoneal space^Q.

- Angiography has been used for injuries that demonstrate active extravasation by CT^Q.
- Angiography can identify specific sites of bleeding from the splenic parenchyma and underlying segmental or trabecular vessels; however, it cannot characterize the splenic parenchymal injury but can be complementary to CT.
- Advantage of angiography: Potential to obstruct sites of bleeding endovascularly using angioembolization^Q.

- Patients who are candidates for non-operative management of their splenic injury but demonstrate a blush by CT, indicating active extravasation, may benefit from angiography with embolization to eliminate the splenic pseudoaneurysm^Q.
- Angiographic embolization is considered only in hemodynamically stable patients^Q.

Management

- With appropriate patient selection, many patients with blunt splenic trauma can be managed without splenectomy^Q.
- No bleeding patient should go without splenectomy or splenic repair, especially in an attempt to push the figurative nonoperative envelope^Q.

- Hemodynamic stability is a prerequisite for nonoperative management and must be present without ongoing intravascular volume support^Q.
- Hemodynamic stability is indicated by a normal blood pressure and lack of tachycardia, no physical examination findings indicating shock, and absence of metabolic acidosis^Q.

- Nonoperative management is reserved for grades I, II and isolated grade III injuries^Q.

Indications of Operative management of Splenic Trauma

- Instability at admission^Q
- Exact location of bleeding is unknown^Q
- Failed nonoperative management^Q

- Best approach: Midline incision with packing of all four quadrants in cases of hemodynamic instability^Q.
- Drains should not be placed unless there is concern that the tail of the pancreas was also injured^Q.

Splenic injury secondary to penetrating abdominal trauma

- Splenic injury secondary to penetrating abdominal trauma is usually identified during laparotomy and should be addressed based on the presence or absence of ongoing bleeding.^Q
- Splenectomy is performed in cases of ongoing bleeding^Q.

American Association for the Surgery of Trauma: Spleen Organ Injury Scale

Grade	Type	Description of Injury
I	Hematoma	Subcapsular tear <10% surface area
	Laceration	Capsular tear <1 cm parenchymal depth
II	Hematoma	Subcapsular tear, 10%-50% surface area; intraparenchymal, <5 cm in diameter
	Laceration	Capsular tear, 1-3 cm parenchymal depth that does not involve a trabecular vessel
III	Hematoma	Subcapsular tear >50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma ≥5 cm or expanding
	Laceration	>3 cm parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen)
V	Hematoma	Completely shattered spleen
	Laceration	Hilar vascular injury devascularizes spleen

41. Ans. b. Spleen is most common organ to be involved
 42. Ans. a. Pain over left shoulder
 43. Ans. b. Young patients
 44. Ans. b. Obliteration of splenic shadow
 45. Ans. d. Catgut suturing with omental patch (Ref: Shackelford 7/e p1638)

The placement of a **simple monofilament suture** through the **splenic parenchyma** (often in a mattress technique and incorporating a piece of Gelfoam or an omental patch placed at the site of bleeding) will often **bring about satisfactory hemostasis**.

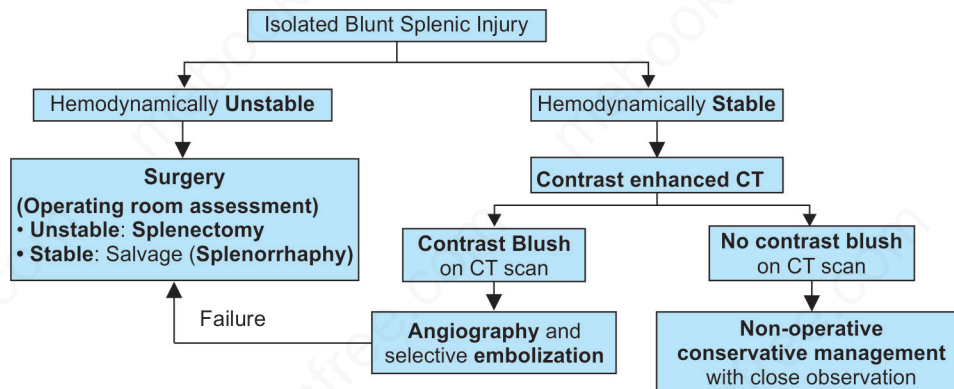
46. Ans. a. Hemoperitoneum
 47. Ans. c. Splenic rupture
 48. Ans. c. Obliterated colonic gas shadow (Ref: emedicine.medscape.com/article/373694-overview)

Signs of Splenic Injury in X-ray Abdomen	
<ul style="list-style-type: none"> • Obliteration of spleen outline^Q • Intendation of gastric air bubble on the left side^Q • Some of the left lower ribs may be fractured^Q 	<ul style="list-style-type: none"> • Obliteration of psoas shadow^Q • Elevation of left hemidiaphragm^Q • Increased free fluid in between air filled intestinal coils^Q

49. Ans. d. Conservative management
 50. Ans. c. Splenic artery embolization (Ref: Trauma Manual by Moore and Mattox 4/e p252)

- The presence of **contrast blush** on 'contrast enhanced' CT scan is believed to represent **continuous bleeding** and **active extravasation**^Q.
- Presence of **contrast blush** on CECT is related to **failure of non operative management** of splenic injury, and is an **indication for angiography** and **selective embolization** in stable patients^Q.
- **Angiographic embolization** can **significantly increase the success rate of non operative management** in patients with a blush and is recommended as the most appropriate intervention^Q.

Currently Recommended Management strategy for Isolated splenic Injuries
<ul style="list-style-type: none"> • If the patient is hemodynamically unstable, surgery is recommended^Q • If the patient is stable but has contrast blush on CT (either from pseudoaneurysm or active extravasation), angiographic embolization is necessary^Q • If neither a blush, nor instability is observed the patient can be managed non-operatively with close monitoring^Q.



SPLENIC TUMORS

51. Ans. a. Lymphoma (Ref: Maingot 11/e p1085; Bailey 26/e p1094, 25/e p1108)

- MC neoplasm of spleen: Lymphoma^Q (Non-Hodgkin's lymphoma)
- MC primary tumor of spleen: Hemangioma^Q
- MC primary malignant tumor of spleen: Angiosarcoma^Q (Hemangiosarcoma)

52. Ans. d. Lymphoma

53. Ans. c. Carcinoma ovary (Ref: Oncological Imaging by Paul Silvermann 2012/chapter 31/The spleen)

In case of "isolated" splenic metastasis, **ovarian** and **colorectal carcinomas** are the most common causes.

- Causes of **isolated splenic metastasis**: Carcinoma Ovary^Q (27%) > Colorectal carcinoma (26%) > Uterine cancer (17%)
- MC primary for metastasis to spleen: Malignant melanoma^Q (30-50%) > CA Breast (21%) > CA Lung (18%).

54. Ans. d. None of the above (Ref: Shackelford 7/e p1651)

HEMANGIOMA SPLEEN

- Hemangioma: MC benign tumor of the spleen^Q.
- Primarily asymptomatic, incidentally found at autopsy^Q
- May be singular, multiple, or even involve the entire spleen^Q.

Clinical Features

- Symptoms result when the tumor enlarges to encroach on adjacent organs.
- Spontaneous rupture^Q can occur in up to 25% of cases.
- A consumptive coagulopathy may be present due to the platelet trapping in the cavernous spaces of the lesion^Q.

Diagnosis

- CT scan demonstrates splenomegaly^Q.
- Angiography demonstrates a "laking" effect similar to that seen with hepatic hemangiomas

Treatment

- Nonsurgical treatment is employed for small, asymptomatic, incidentally detected hemangiomas^Q.
- Splenectomy is the treatment of choice for larger and symptomatic hemangiomas^Q.

SPLENIC ABSCESS

55. Ans. c. Salmonella (Ref: Sabiston 19/e p1555-1556; Schwartz 9/e p1255; Bailey 26/e p1090, 25/e p1104; Shackelford 7/e p1655-1658)

SPLENIC ABSCESS

- Unusual but potentially life threatening illness^Q
- Mortality rate of 15-20% in previously healthy patients, with single unilocular lesions, to 80% for multiple abscesses in immunocompromised patients^Q.

Predisposing Factors for Splenic abscess

- | | |
|---|---|
| <ul style="list-style-type: none"> • Malignancies^Q • Polycythemia vera^Q • Endocarditis^Q • Prior trauma^Q | <ul style="list-style-type: none"> • Hemoglobinopathies^Q • Urinary tract infections • IV drug use^Q • AIDS^Q |
|---|---|

- Approximately 70% of splenic abscesses result from hematogenous spread of the infective organism from another location, as in endocarditis, osteomyelitis, and IV drug use^Q.
- Gram-positive cocci (*Staphylococcus-MC*^Q, *Streptococcus*, or *Enterococcus* spp.) and gram-negative enteric organisms are typically involved.

- **Salmonella** and **Enterobacter** spp. and other enteric organisms are commonly seen in splenic abscess in patients of sickle cell anemia.

- Fungal abscesses (e.g., *Candida* spp.) also occur, typically in immunosuppressed patients^Q

Clinical Features

- Splenic abscesses present with nonspecific symptoms: vague abdominal pain, fever, peritonitis, and pleuritic chest pain^Q.
- Splenomegaly is not typical.

Diagnosis

- CT: Investigation of choice for diagnosis of splenic abscess^Q.
- USG: Diagnosis can also be made with ultrasound.

Treatment

- Unilocular abscesses: Percutaneous drainage + antibiotics (success rates 75-90%)^Q
- Multilocular lesions: Splenectomy + Drainage of the left upper quadrant + Antibiotics^Q

SPLENIC CYST

56. Ans. a. Hydatid cyst (Ref: Sabiston 19/e p1555; Schwartz 9/e p1255; Bailey 26/e p1089, 25/e p1103; Shackelford 7/e p1650-1651)

- MC splenic cyst: Parasitic or Hydatid cyst (*Echinococcus*)^Q
- MC non-parasitic splenic cyst: Pseudocyst (secondary to trauma)^Q
- MC congenital nonparasitic splenic cyst: Epidermoid cysts^Q

ACCESSORY SPLEEN

57. Ans. c. Splenic hilum (Ref: Schwartz 10/e p1424, 9/e p1246; Bailey 26/e p1089, 25/e p1103; Shackelford 7/e p1622, 1660)

ACCESSORY SPLEEN

- **Splenunculi** are single or multiple accessory spleens that are found in approximately 10–30% of the population.
- MC site: **Near the hilum** of the spleen (in 50%^Q) >Related to the **splenic vessels** or **behind the tail of pancreas** (in 30%)
- **Failure to identify and remove** these at the time of splenectomy **may give rise to persistent disease**^Q.

Usual Location of Accessory Spleens	
<ul style="list-style-type: none"> • Splenic hilum (MC)^Q • Tail of the pancreas^Q • Gastrosplenic ligament • Splenocolic ligament • Greater omentum along the greater curvature of the stomach 	<ul style="list-style-type: none"> • Left transverse mesocolon • Mesentery • Left mesocolon • Left ovary • Pouch of Douglas • Left testis

58. Ans. b. Hilum of spleen

59. Ans. b. Hilum

60. Ans. b. Presacral areas

61. Ans. a. Splenic hilum

62. Ans. a. Hilum of spleen

MISCELLANEOUS

63. Ans. a. Splenectomy (Ref: Sabiston 19/e p1432; Schwartz 10/e p1280-1281, 9/e p1112; Blumgart 5/e p1079-1091; Shackelford 7/e p1597; Harrison 18/e p2598)

LEFT SIDED PORTAL HYPERTENSION

- Portal hypertension **due to isolated splenic vein thrombosis**^Q is known as left sided portal hypertension or **sinistral hypertension**^Q.
- **Pressure in portal vein and SMV are normal**^Q
- There is **gastrosplenic venous hypertension** leading to **formation of gastric varices**^Q

Causes

- **Pancreatitis (MC)**^Q leading to splenic vein thrombosis
- Neoplasm, Trauma

Treatment

- **Splenectomy** is the **treatment of choice**^Q.

64. Ans. b. 2 (Ref: Guyton 10/e p160; Sabiston 19/e p1548; Schwartz 10/e p1423-1445, 9/e p1246-1247)

SPLEEN

- **Normal weight: 75-100 gm**^Q
- **Average blood flow: 300 ml/min**^Q
- Functions as the **primary filter** of the **reticuloendothelial system**^Q, sequestering and removing antigens, bacteria, senescent or damaged cellular elements
- **Important role in humoral immunity, producing IgM and the opsonins, tuftsin and properdin**^Q
- **Important component of the complement activation system**^Q
- **Source of extramedullary hematopoiesis**^Q.

- **Contains 2% of total blood volume** (known as **blood bank of body**)^Q

65. Ans. c. Rupture of spleen and distribution of its tissue on peritoneum (Ref: Shackelford 7/e p1616)

SPLENOSIS

- **Splenosis** or **regeneration of miniscule splenic remnants** in the **peritoneal cavity**^Q
- May be **encountered in cases of traumatic rupture** where **splenic tissue disseminates** throughout the **peritoneal cavity**^Q.

66. Ans. a. Sickle cell anemia

67. Ans. a. Culling

68. Ans. b. Phrenicolic ligament (Ref: Grays 40/e p1107-1108, 1214, 1228, 1191; BDC 4th/vol II/230, 233-234)

SPLENIC ANATOMY

- Spleen is **largest lymphatic organ**^Q
- Related to 9th, 10th and 11th ribs; Long axis is along 10th rib^Q
- Develops from cephalic part of dorsal mesogastrium
- Superior border is notched at anterior margin^Q
- Nerve supply from celiac plexus^Q

Ligaments related to Spleen

- Phrenicocolic ligament** prevents downward displacement^Q
- Linorenal ligament** contain tail of pancreas and splenic vessels^Q
- Gastrosplenic ligament** contain short gastric vessels^Q

69. Ans. d. Derives its nerve supply from celiac plexus

70. Ans. a. Asplenia (Ref: Nelson 18/e p1929)

Right Isomerism (Asplenia)	Left Isomerism (Polysplenia)
<ul style="list-style-type: none"> Spleen is absent, either side of midline resembles right side^Q Also known as bilateral right sidedness Asplenia is associated with severe cardiac abnormalities Relatively poor prognosis 	<ul style="list-style-type: none"> Multiple small spleens placed on either side of midline, either side of midline resembles left side^Q Also known as bilateral left sidedness Associated with less severe cardiac abnormalities Relatively better prognosis

71. Ans. a. Chronic pancreatitis

72. Ans. d. All of the above (Ref: Bailey 26/e p1091, 25/e p1105)

TROPICAL SPLENOMEGALY

- Massive splenic enlargement** frequently occurs in the **tropics from malaria, kala-azar and schistosomiasis**^Q.
- Occasionally, splenomegaly cannot be fully attributed to these diseases.
- It may result from **occult infection** or be **related to malnutrition**.
- The **massive splenomegaly** observed in this condition may **require removal** for those patients **disabled by anemia or local symptoms**^Q.
- Lifelong antimalarial therapy** is indicated in **malaria endemic areas**^Q.

73. Ans. a. Splenic artery (Ref: Sabiston 19/e p1761-1763; Schwartz 10/e p1438, 9/e p1256; Bailey 26/e p1089-1090, 25/e p1103-1104; Shackelford 7/e p1098-1100)

SPLENIC ARTERY ANEURYSMS

- MC site of intra-abdominal aneurysm: Aorta > Splenic artery^Q

- MC site of splanchnic artery aneurysm: Splenic artery^Q
- MC causes: Arteriosclerosis^Q
- Usually **saccular, multiple aneurysm** is 20%^Q

- Calcification** is present in **one-third**, and **mostly situated** in the **distal third**^Q of the splenic artery.
- Four times **more common in women** (possible factors include **multiparity, portal hypertension, arterial fibrodysplasia, pancreatitis**, and, less commonly, **trauma, arteritis, and septic emboli**)^Q
- Aneurysmal **rupture** in **pregnancy** usually occurs during the **third trimester**^Q.

Factors Increasing the Risk of Rupture

- | | |
|--|--|
| <ul style="list-style-type: none"> Young age^Q Absence of aneurysmal calcification^Q | <ul style="list-style-type: none"> Presence of hypertension^Q Aneurysm diameter >1.5 cm^Q |
|--|--|

Management

- Documented **aneurysmal enlargement** and **symptoms** caused by aneurysm are **indications of operation**^Q.
- An aneurysm detected in a **female** who anticipate pregnancy should be removed and one **detected during pregnancy** should be removed **before the third trimester**^Q.

- Proximal aneurysms** are excised after proximal and distal ligations
- Mid-splenic aneurysms** are **excluded** by proximal and distal ligations of the splenic artery and all collateral vessels.
- Distal or hilar aneurysm** is the **most common** and is treated with **aneurysmectomy** and **splenectomy**^Q.

SECTION 4

UROLOGY

CHAPTERS

- ❖ Kidney and Ureter
- ❖ Urinary Bladder
- ❖ Prostate and Seminal Vesicles
- ❖ Urethra and Penis
- ❖ Testis and Scrotum

Kidney and Ureter

MULTIPLE CHOICE QUESTIONS

RENAL AND URETERIC CALCULI

- Renal calculi associated with proteus infection:
(All India 2011, 2009)
 - Uric acid
 - Triple phosphate
 - Calcium oxalate
 - Xanthine
- Nephrolithiasis occurs with the toxicity of: (COMEDK 2005)
 - Ritonavir
 - Saquinavir
 - Indinavir
 - Nelfinavir
- Not true about 'Struvite Stones' is: (AIIMS Nov 2001)
 - Better known as staghorn calculus
 - These are triple phosphate stones
 - Common in infected urine
 - Usually seen in acidic urine
- Randall's plaques causes: (TN 98)
 - Bile stones
 - Urinary stones
 - Premalignant lesions
 - Bacterial infections
- Commonest stone in case of UTI: (AIIMS Nov 97)
 - Phosphate
 - Urate
 - Cysteine
 - Calcium oxalate
- Oxalate stones are found in: (PGI June 2006)
 - Ethylene glycol
 - Ethanol
 - Diethyl glycol
 - Methyl alcohol
- Staghorn calculus is made of: (DNB 2012 UPSC 97)
 - Oxalate
 - Phosphate
 - Uric acid
 - Cystine
- Renal stones which are laminated and irregular in outline are: (Recent Question 2013)
 - Uric acid
 - Calcium oxalate
 - Struvite
 - Cystine

RENAL AND URETERIC CALCULI CLINICAL FEATURES

- Locate the renal stone with pain radiating to medial side of thigh and perineum due to slipping of stone in males: (AIIMS June 2010, All India 96)
 - At pelvic brim
 - Intramural opening of ureter
 - Junction of ureter and renal pelvis
 - At crossing of gonadal vessels and ureter
- A patient was admitted with complaints of ureteric stone. He was on treatment with IV fluids and analgesics. Suddenly he developed radiating pain to the pubic area and medial aspect of the thigh. The stone is coming down. What is the most probable site of lodgment of the stone? (DPG 2011)
 - At renal pelvis
 - At pelvic brim
 - At the level of gonadal vessels
 - Intramural portion of the ureter
- Triad of renal colic, swelling in loin which disappears after passing urine is called: (All India 96)
 - Kocher's triad
 - Saint's triad
 - Dietel's crisis
 - Charcot's triad
- Ureteric colic due to stone is caused by: (UPPG 2010, All India 2008)
 - Stretching of renal capsule due to back pressure
 - Increased peristalsis of ureter to overcome the obstruction
 - Irritation of intramural ureter
 - Extravasation of urine
- A patient with alkaline urine which is cloudy with plenty of pus cells is suffering from infection with: (Kerala 89)
 - E. coli
 - Proteus
 - TB
 - None
- Referred pain from ureteric colic is felt in the groin due to involvement of the following nerve: (All India 2003)
 - Subcostal
 - Iliohypogastric
 - Ilioinguinal
 - Genitofemoral
- Commonest presentation of bilateral ureteric stones: (AIIMS 91)
 - CRF
 - UTI
 - Pain
 - Hematuria
- Most severe pain in ureteric stone is seen in cases of: (UPPG 99)
 - Oxalate stones
 - Triple phosphate
 - Cystine stone
 - Uric acid stone
- Ureteric colic characterized by all except: (UPPG 2007)
 - Acute onset
 - Stillness of the patient
 - Responds to antispasmodics
 - Radiates to the groin
- Treatment of choice of ureteric colic is: (GB Pant 2010)
 - Nitrites
 - Pethidine
 - Adrenaline
 - Diclofenac

RENAL AND URETERIC CALCULI DIAGNOSIS AND TREATMENT

19. A patient present with pain and tenderness in the left iliac fossa. USG shows a 3 cm stone in the renal pelvis without any hydro-nephrosis. Most appropriate management: (AIIMS May 2012)
 - a. PCNL
 - b. ESWL
 - c. Diuretics
 - d. Medical dissolution therapy with KCl
20. All are radioopaque except one: (AIIMS June 2000)
 - a. Oxalate
 - b. Uric acid
 - c. Cystine
 - d. Mixed
21. A child presents with complaints of abdominal colic and hematuria USG showed a renal stone 2.5 cm in diameter in renal pelvis the next step in management of this case: (AIIMS Nov 2000)
 - a. ESWL
 - b. Pyelolithotomy
 - c. Nephroureterostomy
 - d. Conservative
22. Which of the following stones is hard to break by ESWL? (All India 2010)
 - a. Calcium oxalate monohydrate
 - b. Calcium oxalate dehydrate
 - c. Uric acid
 - d. Struvite
23. A 50 years old female is admitted with abdominal pain and anuria. Radiological studies revealed: bilateral impacted ureteric stones with hydronephrosis. Urine analysis showed RBCs with pus cells in urine. Serum creatinine level was 16 mg/dl and urea level was 200 mmol/l. Which of the following should be the immediate treatment? (All India 2010)
 - a. Hemodialysis
 - b. 'J' stent drainage
 - c. Lithotripsy
 - d. Ureteroscopic removal of stones
24. What complication should one expect when PCNL is done through 11th intercostals space? (All India 2010)
 - a. Hydrothorax
 - b. Hematuria
 - c. Damage
 - d. Remnants fragments
25. Which of the following is not a contraindication for extra corporeal shockwave lithotripsy (ESWL) for renal calculi? (AIIMS June 2003)
 - a. Uncorrected bleeding diathesis
 - b. Pregnancy
 - c. Ureteric stricture
 - d. Stone in a calyceal diverticulum
26. A 10 mm calculus in the right lower ureter associated with proximal hydronephrosis is best treated with: (All India 2003)
 - a. ESWL
 - b. Antegrade percutaneous access
 - c. Open ureterolithotomy
 - d. Ureteroscopic retrieval
27. Treatment used for lower ureteric stone is: (AIIMS June 98)
 - a. Endoscopic removal
 - b. Diuretics
 - c. Drug dissolution
 - d. Laser
28. Steinstrasse is: (HPU 2001)
 - a. Staining of stones
 - b. Stones
 - c. Failure of ESWL
 - d. Ureteric obstruction due to fragments in ureter
29. Which of the following statements about the Holmium: YAG laser is incorrect? (AIIMS June 2004)
 - a. It has a wavelength of 2100 nm
 - b. Its use for uric acid stones has caused deaths due to generation of cyanide
 - c. It is effective against the hardest urinary stones
 - d. It can even cut the wire of stone baskets
30. All are indicated in a patient with cystinuria with multiple renal stones except: (AIIMS Nov 2012)
 - a. Cysteamine
 - b. Increase fluid intake
 - c. Alkalinization of urine
 - d. Penicillamine
31. Radiolucent renal stones are composed of: (PGI 85)
 - a. Cysteine
 - b. Calcium phosphate
 - c. Calcium phosphate
 - d. Uric acid
 - e. Xanthine
32. Percentage of renal stones which are radio opaque: (JIPMER 86)
 - a. 10%
 - b. 25%
 - c. 37%
 - d. 75%
 - e. 90%
33. Dormia basket is used for removal of renal calculi in the: (JIPMER 85)
 - a. Pelvic ureteric junction
 - b. Upper 1/3rd of ureter
 - c. Middle 1/3rd of ureter
 - d. Lower 1/3rd of ureter
34. Which is false regarding ureteric stones? (AIIMS 92)
 - a. Urine is always infected
 - b. Should be removed immediately
 - c. Source is always the kidneys
 - d. Pain is referred to tip of penis in intramural stones
35. Which one of the following is radiolucent stone? (Recent Question 2015, GB Pant 2010, MCI Sept 2007)
 - a. Calcium oxalate
 - b. Cystine
 - c. Uric acid
 - d. Phosphate
36. Treatment of choice for 0.5 mm renal calyx stone is: (DNB 2007)
 - a. ESWL
 - b. PCNL
 - c. Ureteroscopy
 - d. Cystoscopy
37. All are risk factors for nephrolithiasis except: (DNB 2007)
 - a. Renal tubular acidosis
 - b. High protein intake
 - c. High calcium intake
 - d. Hypercalciuria
38. All of the following statement about renal calculi are true, except: (All India 93)
 - a. Cystine stones form in acidic urine
 - b. Struvite stones form in alkaline urine
 - c. Oxalate stones are radiopaque
 - d. Uric acid stones are resistant to ESWL
39. Staghorn calculus is made of: (DNB 2000)
 - a. Oxalate
 - b. Phosphate
 - c. Uric acid
 - d. Cystine
40. Treatment used for lower ureteric stone is: (AIIMS June 98)
 - a. Endoscopic removal
 - b. Diuretics
 - c. Drug dissolution
 - d. Laser
41. Chandu, 45-years male shows calcification on the right side of his abdomen in an AP view. In lateral view the calcification is seen to overlie the spine. Most likely diagnosis is: (All India 2001)
 - a. Gallstones
 - b. Calcified mesenteric nodes
 - c. Renal stones
 - d. Calcified rib
42. Which of the following advises is not given to a 35 years old female patient with recurrent renal stone? (AIIMS Nov 2012)
 - a. Increase water
 - b. Restrict protein
 - c. Restrict salt
 - d. Restricted calcium intake
43. Stone which is resistant to lithotripsy? (AIIMS Nov 2010)
 - a. Calcium oxalate
 - b. Triple phosphate stone
 - c. Cystine stone
 - d. Uric acid stone

44. Which of the following are radiolucent renal stones?
 a. Uric acid stones (MHPGMCET 2002) (JIPMER 2012)
 b. Cystine stones
 c. Mixed stones
 d. Calcium oxalate stones
45. Which of the following is not true regarding ureteric calculus? (MHPGMCET 2008)
 a. Severity of pain increases with size of the calculus
 b. Hematuria is invariably seen in all cases
 c. Pain may radiate to the anterior aspect of thigh
 d. Pain may radiate to tip of the penis
46. Commonest cause of ureteric obstruction:
 a. Stone b. Clot (MHSSMCET 2006)
 c. Cast d. Carcinoma
47. LASER used in treatment of ureteric calculi: (MHSSMCET 2008, 2006, All India 2003)
 a. Holmium b. Nd-Yag
 c. Argon d. CO₂
48. Following is true about PCNL except: (MHSSMCET 2009)
 a. Bleeding is least concerned complication
 b. Involves the placement of a hollow needle into the renal collecting system through the soft tissue of the loin and the renal parenchyma
 c. Perforation of the colon or pleural cavity during placement of the percutaneous track
 d. Perforation of the collecting system may occur
49. Laser used in treatment of prostatic and ureter diseases: (MHSSMCET 2010)
 a. Nd-Yag b. Holmium
 c. Argon d. CO₂
50. A patient is passing stones recurrently in urine for past few years. All are to be restricted in diet except: (AIIMS Nov 2010)
 a. Protein restriction b. Calcium restriction
 c. Salt restricted d. Phosphate restriction

RENAL INFECTIONS

51. Most common cause of emphysematous pyelonephritis: (GB Pant 2011, COMEDK 2008)
 a. E. coli b. Proteus
 c. Klebsiella d. Pseudomonas
52. Sheela, a middle aged diabetic female presented with flank pain and fever. On U/S the kidney was irregular and showed fat density lesion with calculi. The diagnosis is most probably: (AIIMS Nov 2001)
 a. TB kidney
 b. Xanthogranulomatous kidney
 c. Chronic pyelonephritis
 d. Renal abscess
53. Following is true of pyonephrosis except: (AIIMS 92)
 a. Commonly associated with renal calculi
 b. Always unilateral
 c. Is a complication of hydronephrosis
 d. Follows acute pyelonephritis
54. Subcapsular nephrectomy is indicated is: (PGI 93)
 a. Perinephric abscess
 b. Hydronephrosis
 c. Pyonephrosis
 d. Solitary adenocarcinoma
55. A boy is suffering from acute pyelonephritis. Most specific urinary finding will be: (AIIMS May 2012)
 a. WBC cast
 b. Leucocyte esterase test
 c. Nitrite test
 d. Bacteria in Gram stain
56. Xanthogranulomatous pyelonephritis is often associated with infection by: (DNB 2010 COMEDK 2009)
 a. Proteus b. E. coli
 c. H. influenza d. Klebsiella
57. Most common predisposing factor for chronic pyelonephritis is: (DNB 2004, 2000)
 a. Diabetes mellitus b. Renal stone
 c. Posterior urethral valve d. Vesicoureteric reflux

GENITOURINARY TUBERCULOSIS

58. Most common route of infection in kidney tuberculosis: (Recent Question 2015, All India 93)
 a. Ascending spread b. Hematogenous
 c. Lymphatic spread d. Direct invasion
59. The most sensitive imaging modality to detect early renal tuberculosis is:
 a. Intravenous urography
 b. Computed tomography
 c. Ultrasound
 d. Magnetic resonance imaging (PGI Dec 98)
60. In genitourinary TB, true is: (PGI Dec 98)
 a. Sterile pyuria is consistent finding
 b. AFB in early morning sample is always positive
 c. MC site is pelvis
 d. Commonest cause of pyelonephritis
61. Renal tuberculosis originates in the: (JIPMER 81, PGI 86)
 a. Renal papilla
 b. Renal medulla
 c. Afferent tubules
 d. Efferent arteriole of glomerulus
62. "Golf-hole" ureter is seen in: (WBPG 2015, 2014; Karnataka 94)
 a. Ureteric calculus
 b. Ureteral polyp
 c. Tuberculosis of ureter
 d. Retroperitoneal fibrosis
63. Earliest and often the only presentation of TB kidney is: (DNB 2005, 2001, AIIMS 78, AMU 88)
 a. Increased frequency
 b. Pain
 c. Hematuria
 d. Renal calculi
64. In a patient who has acid-fast bacilli in the urine:
 a. Calcification of the bladder is common (AIIMS 83)
 b. Bladder disease is associated with extensive renal disease
 c. Ureteric involvement causes shortening of the ureters
 d. Renal disease can produce changes identical to reflux nephropathy
 e. Ureteric calculi are commonly present
65. Genitourinary TB in a male patient presents with:
 a. Painful and tender epididymis (JIPMER 2011)
 b. Bacteriuria without pyuria
 c. Renal cysts (unilateral)
 d. Microscopic hematuria
66. Sterile pyuria is characteristically seen in: (All India 2011)
 a. Renal tuberculosis
 b. Chronic Hydronephrosis
 c. Wilm's Tumor
 d. Neuroblastoma

HYDRONEPHROSIS

67. A lady present with unilateral hydronephrosis on USG. She is asymptomatic. Ureteropelvic drainage is normal. What is/are treatment modality for her? (PGI Dec 2008)
- Pyloroplasty
 - Analgesia SOS
 - Under observation
 - Follow up by USG
68. Unilateral hydronephrosis is due to: (AMC 99)
- Bladder neck contracture
 - Stricture urethra
 - Carcinoma of prostate
 - Ureterocele
69. A 60 years old male with poor stream of urine, post void residual urine is 400 ml, bilateral hydronephrosis and prostate weighing 70g. His urea is 120 and creatinine 3.5. Ideal "next immediate" step: (AIIMS Nov 2010)
- Catheterize with Foley catheter
 - Bilateral PC nephrostomies
 - CT to rule out carcinoma
 - MRI pelvis
70. Hydronephrosis due to obstruction of ureter is best diagnosed by: (MHPGMCET 2008)
- IVU
 - Radioisotope scan
 - Retrograde pyelography
 - Whitaker test

DIAGNOSTIC AND LABORATORY INVESTIGATIONS

71. DTPA scan of hypertensive young lady is normal, USG shows small kidney on left side. Next investigation will be: (AIIMS Nov 2000)
- CT Scan abdomen
 - Retrograde pyelogram
 - Digital subtraction angiography
 - DMSA
72. After a single episode of painless gross hematuria in a boy. Doctor performed an excretory urogram showing a filling defect towards the lower renal infundibulum 1.5 cm in size. What will be the next investigation to be done? (Karnataka 2003, AIIMS Nov 2000)
- Cystoscopy
 - Urine cytology
 - USG
 - Retrograde pyelography
73. An absolute contraindication for IVP is: (All India 96)
- Allergy to the drug
 - Multiple myeloma
 - Blood urea > 200 mg
 - Renal tumor
74. During investigation of hydronephrosis, isotope renogram is useful mainly in: (UPSC 2000)
- Detecting vesicoureteric reflux
 - Anatomical definition
 - Distinguishing between non-obstructed system
 - Identifying ectopic kidney tissue
75. Pseudo kidney is: (J and K 2001)
- Thickened bowel loop on USG
 - Hydronephrosis
 - Unascended kidney
 - Undescended testes
76. The investigation of choice for renal scarring defect in kidney: (All India 2012)
- DMSA scan
 - DTPA scan
 - Dexa scan
 - MCU
77. The substance present in the gallbladder stones or the kidney stones can be best identified by the following techniques: (All India 2003)
- Fluorescence spectroscopy
 - Electron microscopy

- Nuclear magnetic resonance
- X-ray diffraction

78. Reflux nephropathy is diagnosed mainly by: (MCI Sept 2005)
- X-ray KUB
 - Micturating cystourethrogram
 - CT scan
 - MRI
79. A patient presents with hematuria of several days and dysmorphic RBC casts in urine. The site of origin is: (AIIMS Nov 2001)
- Kidney
 - Ureter
 - Bladder
 - Urethra
80. Isotope Renogram: (Karnataka 94)
- Study of rennin mechanism
 - Contrast study of kidneys, ureter and bladder
 - Utilized in mapping the anatomy of kidneys
 - Graphic representation of radioactivity of kidneys
81. 'Rim' and 'ball' nephrograms in intravenous urography are seen in: (COMEDK 2009)
- Normal kidneys
 - Acute obstructive nephropathy
 - Chronic obstructive nephropathy
 - Chronic renal failure
82. Radiation exposure is the least in the following procedure: (AIIMS Nov 2010)
- Micturating cystourethrogram
 - IVP
 - Bilateral nephrostogram
 - Spiral CT for stones
83. Indications of percutaneous nephrostomy: (PGI Nov 2010)
- Stone removal
 - Ureteral obstruction
 - Anterograde renography
 - Renal tumor resection
 - Ischemic renal failure
84. One of the following is characterized by RIM sign: (AIIMS Nov 98)
- Hydronephrosis
 - Hypernephroma
 - Chronic pyelonephritis
 - Polycystic kidney
85. Percutaneous nephrostoma is indicated in: (DNB 2001)
- Polycystic kidney disease
 - Solitary adenocarcinoma
 - Simple hydronephrosis
 - Pyonephrosis

BENIGN RENAL TUMORS

86. Regarding angiomyolipoma of kidney, what is incorrect? (AIIMS Nov 94)
- Pain in the loin
 - Presents with hypertension
 - Bleeding is self limited
 - Nephrectomy is the treatment of choice
87. Central stellate scar on CT scans are seen in: (COMEDK 2008)
- Renal hemangioma
 - Renal oncocytoma
 - Wilm's tumour
 - Papillomas

RENAL CELL CARCINOMA TYPES

88. Renal cell carcinoma histopathologically showing 'perinuclear halo' and "Plant like" structure in malignant cells is seen in: (PGI Dec 2000)
- Clear cell tumor
 - Papillary carcinoma
 - Collecting duct carcinoma
 - Chromophobe cell carcinoma

89. Which of the following statements is true regarding kidney tumors? (PGI Dec 2001)
- Mutated VHL gene is associated with clear cell carcinoma
 - Extreme hyperdiploidy occurs
 - Extreme hypodiploidy occurs
 - Renal papillary carcinoma has defect in chromosome 8
 - Oncocytoma has defect in chromosome 11
90. The most common histological variant of renal cell carcinoma is: (AIIMS Nov 2005)
- Clear cell type
 - Chromophobe type
 - Papillary type
 - Tubular type
91. Chromophobe variant to renal cell carcinoma is associated with: (All India 2010)
- VHL gene mutations
 - Trisomy of 7 and 17 (+7, +17)
 - 3 p deletions (3 p-)
 - Monosomy of 1 and Y (-1, -Y)
92. Bilateral renal cell carcinoma is seen in: (COMEDK 2008)
- Eagle-Barett's syndrome
 - Beckwith-Weidman syndrome
 - von-Hippel Lindau (VHL) syndrome
 - Bilateral angiomyolipoma
93. Most common site of origin of RCC: (MHSSMCET 2008)
- PCT
 - DCT
 - Collecting ducts
 - Loop of Henle

RENAL CELL CARCINOMA CLINICAL FEATURES, PARANEOPLASTIC SYNDROMES

94. All can be seen in hypernephroma, except: (AIIMS Nov 93)
- Polycythemia
 - Renal vein thrombosis
 - Hypertension
 - Hematuria
95. Not correct regarding renal cell carcinoma:
- May be associated with varicocele
 - May invade renal vein (AIIMS Nov 94, June 95)
 - More common in female
 - Arises from proximal convoluted tubule
96. Most common site for secondary metastasis in a case of hypernephroma: (AIIMS Feb 97)
- Adrenal
 - Lungs
 - Brain
 - Bones
97. Painless gross hematuria occurs in: (All India 94)
- Renal cell carcinoma
 - Polycystic kidney
 - Stricture of urethra
 - Wilm's tumor
98. In renal cell carcinoma, which is true? (JIPMER 95)
- Hypercalcemia
 - Polycythemia
 - Cushing syndrome
 - All

99. Cannon ball deposits seen in the lungs are characteristic of: (DNB 2003)
- Seminoma testis
 - Carcinoid
 - Hypernephroma
 - Pheochromocytoma

100. Bilateral RCC may be seen in: (DNB 2002)
- Tuberous sclerosis
 - von-Willebrand's disease
 - von-Hippel Lindau disease
 - von-Recklinghausen disease

101. All are features of hypernephroma except: (HPU 2005)
- Persistent pyrexia
 - Hematuria
 - Polycythemia
 - Lower pole involvement
102. All are true about renal cell carcinoma except: (DPG 2006)
- Invasion of renal vein means inoperability
 - Presents with abdominal pain, hematuria
 - Arises from tubular epithelium
 - More common in males
103. Regarding RCC all are true except: (DPG 2005)
- Renal lump, pain abdomen, hematuria
 - Associated with anemia and low ESR
 - Propensity to invade IVC
 - Invasion of renal vein is contraindication for surgery
104. Not correct regarding renal cell carcinoma:
- May be associated with varicocele
 - May invade renal vein
 - More common in female
 - Arises from proximal convoluted tubule
105. A 55-years old male with 35 pack years presented with painless mass in left scrotal sac and microscopic hematuria. On laboratory investigation, Alpha-fetoprotein and lactate dehydrogenase was negative. What is the diagnosis? (AIIMS May 2013)
- Epididymitis
 - Seminoma
 - Renal cell carcinoma
 - Carcinoma lung

106. All can be seen in hypernephroma, except: (AIIMS Nov 93)
- Polycythemia
 - Renal vein thrombosis
 - Hypertension
 - Hematuria
107. Paraneoplastic syndrome associated with RCC are all of the following except:
- Polycythemia
 - Hypercalcemia
 - Malignant hypertension
 - Cushing syndrome
108. Most common presentation of renal adenocarcinoma: (COMEDK 2005)
- Hematuria
 - Local pain
 - Mass
 - Fever
109. Commonest manifestation of Grawitz's tumor in male: (MHFGMCET 2009)
- Secondary deposits
 - Pathological fracture
 - Hematuria
 - Rapidly developing varicocele

RENAL CELL CARCINOMA DIAGNOSIS AND TREATMENT

110. A patient presented with renal cell carcinoma invading IVC and renal vein. False statement is: (AIIMS Nov 2001, June 2001)
- Pre-op biopsy is not necessary
 - IVC involvement indicates inoperability
 - Pre-op radiotherapy is not essential
 - Chest X-ray should be done to rule out pulmonary metastasis
111. Most important prognostic indicator for renal cell carcinoma: (AIIMS May 2009)
- Nuclear grade
 - Histological type
 - Size
 - Pathological staging
112. The treatment of choice in renal cell carcinoma with the tumor if less than 4 cm in size is: (AIIMS Nov 2004)
- Partial nephrectomy
 - Radical nephrectomy

- c. Radical nephrectomy + post operative radiotherapy
- d. Radical nephrectomy + chemotherapy

113. False regarding hypernephroma is:

- a. Radiosensitive (Recent Question 2014, AIIMS Nov 93)
- b. Arise from cortex usually from pre existing adenoma
- c. May present with rapidly developing varicocele
- d. Usually adenocarcinoma

114. A 30 years old male presents with pain on the right flank and hematuria. CECT abdomen reveals a large 8 x 8 cm sized solid mass in the right kidney and 3 x 3 cm solid mass occupying the upper pole of left kidney. The most appropriate surgical treatment for this patient is: (AIIMS Nov 2002)

- a. Bilateral radical nephrectomy
- b. Right radical nephrectomy and biopsy of the mass from opposite kidney
- c. Right radical nephrectomy and left partial nephrectomy
- d. Right radical nephrectomy only

115. Ideal approach for renal malignancy is: (AIIMS 89)

- a. Transperitoneal
- b. Retroperitoneal
- c. Lumbar incision
- d. Abdominothoracic incision

116. Renal collar to prevent spread of malignancy from kidney is put around: (JIPMER 93)

- a. Aorta
- b. IVC
- c. Renal vein
- d. Renal artery

117. A 40 years old man presented with painless hematuria. Bimanual examination revealed a ballotable mass over the right flank. Subsequently right nephrectomy was done and mass was seen to be composed of cells with clear cytoplasm. Areas of hemorrhage and necrosis were frequent. Cytogenic analysis of this mass is likely to reveal an abnormality of:

- a. Chromosome 1 (All India 2004)
- b. Chromosome 3
- c. Chromosome 11
- d. Chromosome 1

118. A patient with a suspected renal tumor/mass is diagnosed by exfoliative urinary cytology. Which of the following histological types is most likely to be diagnosed on urinary exfoliative cytology? (All India 2012)

- a. Transitional cell carcinoma
- b. Adenocarcinoma
- c. Well differentiated carcinoma (Low grade)
- d. All three type can be easily detected on exfoliative cytology

119. The commonest systemic abnormality associated with renal cell carcinoma is: (COMEDK 2009)

- a. Hypertension
- b. Polycythemia
- c. Elevated ESR
- d. Pyrexia

120. A 40 years old patient with a single kidney presents with a solitary exophytic mass of 4 cm localized at its lower pole. Which amongst the following is the best recommended management option?

- a. Partial nephrectomy
- b. Radical nephrectomy
- c. Radical nephrectomy with dialysis
- d. Radical nephrectomy with immediate renal transplantation

121. Radical Nephrectomy include all of the following except:

(MHSSMCET 2008)

- a. Early ligation of vessels
- b. Lymphadenectomy
- c. Keeping fascia back in place
- d. Removal of kidney including the Gerota's fascia

WILM'S TUMOR

122. Commonest presentation of Wilm's tumour is:

- a. Hematuria (AIIMS Nov 95)
- b. Abdominal lump
- c. Hydronephrosis
- d. Pain in abdomen

123. True regarding Wilm's tumour is:

(AIIMS Nov 94)

- a. Bone metastasis
- b. Always unilateral
- c. Very commonly metastasize to liver
- d. Worst prognosis among infants

124. The most important determinant of prognosis in Wilm's tumor is: (All India 2006)

- a. Stage of disease
- b. Loss of heterozygosity of chromosome 1p
- c. Histology
- d. Age less than 1 year at presentation

125. The ideal timing of radiotherapy for Wilm's tumor after surgery is: (All India 2006)

- a. Within 10 days
- b. Within 2 weeks
- c. Within 2 months
- d. Anytime after surgery

126. Neuroblastoma differs from Wilm's tumor radiologically by all except: (AIIMS June 2001)

- a. Calcification
- b. Aorta and IVC are not eroded but pushed aside
- c. Same location
- d. Intraspinal extension of tumor

127. Earliest symptom of Wilm's tumour:

(JIPMER 86)

- a. Hematuria
- b. Pyrexia
- c. Abdominal mass
- d. Metastases

128. The triad of Wilm's tumour is:

(PGI 88)

- a. Hematuria
- b. Mass abdomen
- c. Pain
- d. Fever
- e. Weight loss

129. All are true about Wilm's tumour except:

(All India 97)

- a. Fever and weakness are clinical features
- b. Arises from primitive cells
- c. Hematuria almost always present
- d. It presents as abdominal mass

130. Good prognosis in Wilm's tumour is seen in:

(Punjab 2008, Kerala 91)

- a. 2-5 years
- b. Less than 1 year
- c. Male child
- d. Female child

131. All are true regarding Wilm's tumour except:

(AIIMS 92)

- a. Preoperative use of Actinomycin D
- b. Postoperative radiotherapy
- c. Good prognosis in infants
- d. Neuroblastoma is the commonest differential diagnosis

132. Commonest site of metastasis of Wilm's tumour is:

(AIIMS 94)

- a. Bones
- b. Lungs
- c. Liver
- d. Brain

133. Which of the following is the postchemotherapy based staging system in Wilm's tumor? (All India 2009)

- a. National Wilm's tumor staging system (NWTSG)
- b. International society of Pediatric Oncology (SIOP)
- c. AJCC TNM
- d. Chadwick

134. All are associated with Wilm's tumor except: (AIIMS Feb 97)

- a. Aniridia
- b. Male pseudo hermaphrodite
- c. Arthrogryposis multiplex congenita
- d. Hemihypertrophy

135. Which of the following is the treatment of choice for stage I Wilms' tumor? (All India 2012)

- Laparoscopic nephrectomy
- Open nephroureterectomy
- Chemotherapy
- Observation

136. Wilms' tumor chromosome is: (JIPMER 2012)

- 13 q
- 13 p 14
- 11 p 13
- 17

TUMORS OF RENAL PELVIS

137. Commonest type of cancer of the renal pelvis and upper ureter is: (NIMHANS 87)

- Transitional cell carcinoma
- Adenocarcinoma
- Squamous cell carcinoma
- Nephroblastoma

138. Epidermoid carcinoma of renal pelvis is usually associated with: (Karnataka 94)

- Multiple papillomas
- Pelvic calculus
- Tuberculosis of kidney
- Filariasis

139. 'Stipple sign' in transitional cell carcinoma of the renal collecting system is best demonstrated by: (COMEDK 2009)

- Intravenous urography
- Retrograde pyeloureterography
- Radionuclide scan
- Ultrasound scan

140. Nephroureterectomy is indicated in: (DNB 2011)

- Renal cell carcinoma
- Chronic pyelonephritis
- Polycystic kidney disease
- Transitional carcinoma of the pelvis extending till ureter

RENAL TRAUMA

141. Which of the following is true about renal trauma? (All India 95)

- Urgent IVP is indicated
- Exploration of the kidney to be done in all cases
- Lumbar approach to kidney is preferred
- Renal artery aneurysm is common

142. All except one are correct regarding renal trauma: (AIIMS June 95)

- Observation is best
- IVP is indicated
- Exploration indicated in all cases
- Hematuria is a cardinal sign

143. Which does not happen in unilateral renal trauma? (AIIMS 92)

- Hypertension
- Uremia
- Clot formation
- Perinephric hematoma

144. After RTA, a young male presented with non-pulsatile retroperitoneal hematoma. On table IVP was done. Right kidney was not visualized. Left kidney showed immediate excretion of dye. What is next step in the management? (AIIMS Nov 2011)

- Nephrectomy
- Open Gerotas fascia and explore proximal renal vessels
- Perform retrograde pyelography
- Perform on table angiography

145. Renal trauma is best treated by: (UPSC 98)

- Observation and supportive measures
- Early drainage of perirenal hematoma
- Heminephrectomy
- Nephrostomy

146. Forty eight after sustaining a blunt abdominal injury, a 15 years old boy presents with hematuria and pain in the left side of abdomen. On examination, he has a pulse rate of 96/minute with a BP of 110/70 mm Hg. His Hb is 10.8 gm% with a PCV of 31%. Abdominal examination revealed tenderness in left lumbar region but no palpable mass. The most appropriate investigation to diagnose and find the extent of renal injury would be: (UPSC 2005)

- Sonographic evaluation of abdomen
- Intravenous pyelography
- Contrast enhanced computed tomography
- MR urography

147. What percent of cases with injury to kidney require surgical exploration? (MAHE 2008)

- 20%
- 90%
- 50%
- 70%

148. During renal rupture the nephrectomy is not attempted until: (UPPG 2010)

- Fluid replacement
- Antibiotics covers
- Contralateral renal function is ascertained
- Renal angiogram

149. In renal trauma, which statement is not correct?

- Exploration is indicated in 90% of cases (Orissa 2011)
- Hematuria is a cardinal sign
- Transperitoneal approach is preferred
- IVP is urgently indicated

150. Number of grades of blunt trauma kidney by C.T. scan are: (Orissa 2011)

- 3
- 4
- 5
- 6

151. Absolute indication for surgical exploration after renal trauma? (MHSSMCET 2008)

- Hematuria
- Pulsatile hematoma
- Cortical renal contusion
- Delayed arterial injury

152. A 25 years old male presents to emergency with history of road traffic accident two hours ago. The patient is hemodynamically stable. Abdomen is soft. On catheterization of the bladder, hematuria is noticed. The next step in the management should be: (AIIMS Nov 2004)

- Immediate laparotomy
- Retrograde cystourethrogram (RGU)
- Diagnostic peritoneal lavage (DPL)
- Contrast enhanced computed tomography (CECT) of abdomen

URETERIC INJURY

153. Inadvertent surgical injury of the ureter leads to: (PGI 80, AIIMS 81, 87)

- Complete renal atrophy
- Hematuria
- Renal failure
- Hydronephrosis
- Hypertension

154. Commonest cause of ureteric injury during surgical operation is: (UPPG 2007, 2006)

- Abdominoperineal resection
- Hysterectomy
- Prostatectomy
- Colectomy

POLYCYSTIC KIDNEY DISEASE

155. All of the following are features of adult polycystic kidney disease except: (COMEDK 2005)
 - a. Autosomal recessive trait
 - b. Present as renal mass
 - c. Haematuria
 - d. Renal failure
156. Polycystic kidney disease is associated with all of the following except: (COMEDK 2010)
 - a. Cerebral aneurysms
 - b. Mitral valve prolapsed
 - c. Renal cell carcinoma
 - d. Hepatic cysts
157. Not true about polycystic kidney disease is: (AIIMS Nov 97)
 - a. Autosomal dominant
 - b. Proteinuria < 2 gm/day
 - c. Leads to CRF
 - d. Decompression of cyst leads to normal renal function
158. In adult polycystic kidney, all are true except: (AIIMS June 2001)
 - a. Hypertension is rare
 - b. Hematuria is a common symptom
 - c. Cysts are seen in liver spleen and pancreas
 - d. Autosomal dominant transmission is seen
159. True of autosomal dominant polycystic kidney disease I and II respectively: (PGI June 2002)
 - a. Chromosomes 16 and 5
 - b. 16 and 4
 - c. 11 and 5
 - d. 11 and 4
160. Polycystic kidneys can be associated with: (PGI 84)
 - a. Cysts in liver lungs
 - b. Coarctation of aorta
 - c. Berry aneurysms
 - d. All
161. Polycystic kidney may be associated with cyst in all the sites except: (Bihar PG 2014, All India 91)
 - a. Lung
 - b. Liver
 - c. Pancreas
 - d. Brain
162. Treatment of choice in polycystic kidney is: (Kerala 91)
 - a. Removal of cyst
 - b. Nephrectomy
 - c. Dialysis
 - d. Renal transplant
163. The incidence of liver cysts in childhood polycystic kidney disease is: (All India 92)
 - a. 5%
 - b. 10%
 - c. 18%
 - d. 50%
164. Polycystic disease of the kidney may have cysts in all the following organs except: (All India 2004)
 - a. Lungs
 - b. Liver
 - c. Pancreas
 - d. Spleen
165. "Spider leg" deformity in excretory urogram occurs in: (MCI March 2010, UPPG 2007)
 - a. Hydronephrosis
 - b. Polycystic kidney
 - c. Ureterocele
 - d. Renal agenesis
166. The typical appearance of "spider leg" on excretory urography is seen in: (UPSC 2008)
 - a. Hydronephrosis
 - b. Polycystic kidney
 - c. Medullary sponge kidney
 - d. Renal cell carcinoma
167. All are true about polycystic kidney except: (UPPG 2009)
 - a. Inherited as autosomal recessive
 - b. Hypertension and hematuria are common symptoms
 - c. Spider leg deformity
 - d. Associated with cysts in the liver and spleen
168. True about adult polycystic kidney disease is all except:
 - a. Autosomal dominant inheritance (AIIMS 2001)
 - b. Hypertension is rare
 - c. Can be associated with cysts in liver, lungs and pancreas
 - d. Pyelonephritis is common

169. Which of the following is the common extrarenal involvement in autosomal dominant polycystic kidney disease? (AIIMS Nov 2004)
 - a. Mitral valve prolapse
 - b. Hepatic cysts
 - c. Splenic cysts
 - d. Colonic diverticulosis
170. Which one of the following statements is wrong regarding adult polycystic kidney disease? (AIIMS May 2004)
 - a. Kidneys are enlarged in size
 - b. The presentation is unilateral
 - c. Intracranial aneurysms may be associated
 - d. Typically manifests in the 3rd decade
171. All of the following are true about childhood polycystic kidney disease, except:
 - a. Autosomal dominant
 - b. Pulmonary hypoplasia may be seen
 - c. Renal cysts are present at birth
 - d. Congenital hepatic fibrosis may be seen

PUJ OBSTRUCTION

172. Not true about congenital PUJ obstruction is: (AIIMS Nov 2001)
 - a. Can be associated with renal agenesis
 - b. Can be diagnosed antenatally
 - c. Bilateral in 10–15% of cases
 - d. Aberrant vessel is the most common cause
173. All are true in PUJO except:
 - a. Commoner in boys
 - b. Bilateral lesions occur in 10–40%
 - c. Right sided lesions predominate
 - d. Intrinsic lesions predominate
174. Most infants and children with PUJO present with: (GB Pant 2008)
 - a. Pain
 - b. Hematuria
 - c. Painless abdominal mass
 - d. Renal failure
175. Best management for a symptomatic 6 years male with PUJ obstruction: (GB Pant 2010)
 - a. Endopyelotomy
 - b. Foley V-Y pyeloplasty
 - c. Dismembered pyeloplasty
 - d. Wait and watch
176. Investigation of choice for documentation of obstructive nature of pelvicalyceal system dilatation:
 - a. IVP
 - b. DTPA scan
 - c. Whittaker test
 - d. Ultrasound
177. Not true about PUJ obstruction is: (AIIMS Nov 2001)
 - a. Retrograde pyelography is useful to locate the site of obstruction
 - b. Endoscopic pyelotomy is contraindicated
 - c. Whittaker test is of clinical significance
 - d. Dismembered pyeloplasty is the procedure of choice
178. Distention of abdomen with passage of large amount of urine is known as: (MHPGMCET 2001)
 - a. Dietl's crisis
 - b. Anderson-Hynes crises
 - c. Meteorism
 - d. Strangury

CONGENITAL ANOMALIES OF KIDNEY

179. Potter facies and oligohydromnios are pathognomic of:
 - a. Bilateral renal agenesis
 - b. Unilateral renal agenesis
 - c. bilateral renal disease
 - d. Unilateral cystic disease
180. Potter's facies is characterized by:
 - a. Hypertelorism
 - b. Prominent inner canthus
 - c. Recessive chin
 - d. Low set ears
 - e. All are true

181. A symptom of medullary sponge kidney disease is:

(All India 95)

- a. Nocturia
- b. Anemia
- c. Azotemia
- d. UTI

182. Which of the following is the most common renal vascular anomaly?

(All India 2010)

- a. Supernumerary renal arteries
- b. Supernumerary renal veins
- c. Double renal arteries
- d. Double renal veins

183. Renal collar which surrounds the aorta has its two limbs split by:

(All India 99)

- a. Left renal vein
- b. Left renal artery
- c. Isthmus of horseshoe kidney
- d. All of the above

184. Persistent fetal lobulation of adult kidney is due to:

(AIIMS Nov 2007)

- a. Congenital renal defect
- b. Obstructive uropathy
- c. Intrauterine infections and scar
- d. Is a normal variant

185. Incidence of Renal ectopia is:

(All India 92)

- a. 1:100000
- b. 1:75000
- c. 1:10,000
- d. 1:1000

186. 'Reverse J' deformity on IVP is seen in:

- a. Congenital megaureter
- b. Ureterocele
- c. Retrocaval ureter
- d. VUR

187. Aberrant renal artery, all true except:

- a. More common in women
- b. Usually towards left
- c. May cause hydronephrosis
- d. Usually divided to gain access to renal pelvis

188. All are true of aberrant renal artery except:

(PGI 93)

- a. Bilateral
- b. Leads to hydronephrosis
- c. Common in females
- d. More common on left side

189. An absent kidney is found in:

(AMU 2005)

- a. 1:200 individuals
- b. 1:700 individuals
- c. 1:1400 individuals
- d. 1:5000 individuals

190. Medullary cystic disease of the kidney is best diagnosed by:

- a. Ultrasound
- b. Nuclear scan
- c. Urography
- d. Biopsy

HORSESHOE KIDNEY

191. Which is false of Horseshoe kidney?

(AIIMS 92)

- a. Spider like appearance in IVP
- b. Ureteral obstruction common
- c. Lower calyx is reversed
- d. Heminephrectomy improves function

192. Isthmus of horses is located at what level?

- a. L1-L2 vertebra
- b. L3-L4 vertebra
- c. L4-L5 vertebra
- d. L2-L3 vertebra

193. "Hand joining sign" and 'Flower vase' pattern of uteters is characteristic of:

- a. Sigmoid kidney
- b. Horseshoe kidney
- c. Crossed ectopia
- d. L-shaped kidney

194. With regard to horse-shoe kidneys, true is:

- a. Usually symptomatic
- b. Most cases require surgery
- c. Division of isthmus is usually required to ensure adequate dependent drainage
- d. Isthmus may contain aberrant vessels

RENAL CYST

195. Spider leg appearance in IVP is suggestive of:

(AP 84, Kerala 86, 88, JIPMER 87)

- a. Renal cyst
- b. Renal carcinoma
- c. Renal Tb
- d. Hydronephrosis
- e. Chronic renal failure

196. Which of the following is the most common renal cystic disease in infants is?

- a. Polycystic kidney
- b. Simple renal cyst
- c. Unilateral renal dysplasia
- d. Calyceal cyst

URETEROCELE

197. Cobra head appearance on excretory urography is suggestive of:

(MCI March 2010)

- a. Horseshoe kidney
- b. Duplication of renal pelvis
- c. Simple cyst of kidney
- d. Ureterocele

198. Treatment of choice for ureterocele?

(MHSSMCET 2009)

- a. DJ stent
- b. Laparoscopic repair
- c. LASER ablation
- d. Endoscopic diathermy

199. Adder head appearance on IVP is/are seen in:

(PGI Nov 2011)

- a. Polycystic kidney
- b. Ureterocele
- c. Horseshoe kidney
- d. Hydronephrosis
- e. Ectopic ureter

200. A 3-years old girl presents with recurrent UTI. On USG shows hydronephrosis with filling defect and negative shadow of bladder with no ectopic orifice:

(UPPG 2004)

- a. Vesicoureteric reflux
- b. Hydronephrosis
- c. Ureterocele
- d. Sacrococcygeal teratoma

URETERIC ABNORMALITIES

201. Ectopic ureter opening is not located in:

(MAHE 2005, AIIMS Nov 98)

- a. Bulbar urethra
- b. Prostatic urethra
- c. Seminal vesicle
- d. Bladder neck

202. Most common congenital anomaly of the upper renal tract is:

(JIPMER 87)

- a. Duplication of renal pelvis
- b. Duplication of ureter
- c. Ectopic ureteric orifice
- d. Congenital megaureter

203. A 9 years old boy presented with abdominal pain and recurrent UTI, IVP reveals duplication of left ureter. The most likely site of ectopic opening would be:

(All India 99)

- a. Prostatic urethra
- b. Ejaculatory duct
- c. Seminal vesicle
- d. Vas deference

204. Ectopic ureter may be frequently associated with:

(JIPMER 81, AMU 89)

- a. Oliguria
- b. Dysuria
- c. Bilateral hydroureter
- d. Paradoxical incontinence

205. True statement about duplex draining system of urinary tract are all except:

(Recent Question 2015, Punjab 2007)

- a. It is most common anomaly of the upper urinary tract
- b. Upper moiety drains lower in the bladder
- c. Lower pole moiety is more prone to obstruction and upper pole more prone to reflux
- d. Yo-Yo Reflux may occur if ureters get fused

206. Weigert-Meyer's rule applies to:

- a. Fusional anomalies
- b. Renal dysplasia
- c. Polycystic kidney disease
- d. Ureteral duplications

207. In a patient with complete ureteral duplication, the opening of ureter draining the upper pole of the kidney is:
- Above and medial to the lower pole ureter
 - Above and lateral to the lower pole ureter
 - Below and medial to the lower pole ureter
 - Below and lateral to the lower pole ureter
 - Always lateral to lower pole ureter
208. In the male, the most common site of termination of the ectopic ureter is the:
- Posterior urethra
 - Anterior urethra
 - Seminal vesicles
 - Vas deference
209. In the female, the most common site of termination of the ectopic ureter is the:
- Vestibule
 - Fallopian tube
 - Ovary
 - Uterus
210. Presentation and evaluation of ectopic ureter, all are true except:
- In males there is duplication in 80% of cases
 - Can present as abdominal mass or HDN on antenatal USG
 - IVP will usually show a functioning but dilated upper pole segment and identify the site of ureteral opening
 - The lower pole is seen as the classic 'drooping lily' sign
211. Classic symptom of ectopic ureter in females:
- Painful defecation
 - Urinary frequency
 - Ureteral incontinence with otherwise normal voiding
 - Labial swelling
212. MC presentation of ectopic ureter in males:
- Recurrent UTI
 - Epididymitis
 - Pelvic pain
 - Seminal vesicle infections

VESICoureTERIC REFLUX

213. In case of vesicoureteric reflux which will be investigation of choice: (AIIMS Nov 98)
- Micturating cystourethrogram
 - IVP
 - Cystography
 - Radionuclide study
214. In a patient suspected to be suffering from vesicoureteric reflux, which one of the following radiological investigations may confirm the diagnosis? (IIPSC 2007)
- Intravenous urography
 - Micturating cystourethrogram
 - Pelvic ultrasound
 - Antegrade pyelography
215. Reflux filling the pelvicalyceal system without dilatation:
- I
 - II
 - IV
 - IV
216. Reflux into pelvis and calyces without dilatation:
- I
 - II
 - IV
 - IV
217. Spontaneous resolution of VUR depends on:
- Grade of reflux
 - Age of presentation
 - Both
 - None

218. Treatment of choice for grade IV vesicoureteric reflux with recurrent UTI: (AIIMS June 2000)
- Cotrimoxazole
 - Bilateral reimplantation of ureter
 - Injection of collagen in the ureter
 - Endoscopic resection of ureter
219. Which of the following statements is true of primary grade IV-V vesicoureteric reflux in young children? (AIIMS May 2006)
- Renal scarring usually begins in the midpolar regions
 - Postnatal scarring may occur even in the absence of urinary tract infections
 - Long-term outcome is comparable in patients treated with either antibiotic prophylaxis or surgery
 - Oral amoxicillin is the choice antibiotic for prophylaxis
220. The most common cause of renal scarring in a 3 years old child is:
- Trauma
 - Tuberculosis
 - VUR induced pyelonephritis
 - Interstitial nephritis

RENAL ARTERY ANEURYSM

221. The risk of rupture in renal artery aneurysms is: (AMU 81, JIPMER 81)
- Less than 1%
 - 5%
 - 20%
 - 75%
 - None of the above

HEPATORENAL SYNDROME

222. Features of hepatorenal syndrome are: (PGI June 2006)
- Urine sodium < 10 meq/L
 - Normal renal histology
 - Renal functional abnormal even after liver become normal
 - Proteinuria
223. Which of the following statements are incorrect with regard to hepatorenal syndrome in a patient with cirrhosis? (All India 2003)
- Creatinine clearance 40 ml/min
 - Urinary sodium < 10 mEq/L
 - Urine osmolality lower than plasma osmolality
 - No sustained improvement in renal function after volume expansion
224. Which of the following statement is incorrect with regard to hepatorenal syndrome in a patient with cirrhosis?
- The creatinine clearance is > 40 ml/min
 - The urinary sodium is < 10 mmol/L
 - The urine osmolality is lower than the plasma osmolality
 - There is poor response to volume expansion

DIALYSIS

225. The following are the complications of hemodialysis except: (JIPMER 81, AIIMS 86)
- Hypotension
 - Peritonitis
 - Hypertension
 - Bleeding tendency

RENAL TRANSPLANT

226. First autologous renal transplantation was done: (All India 2010)
- Hardy
 - Kavosis
 - Higgins
 - Studor

227. All of the following statements are correct about renal transplantation except: (AIIMS Nov 2004)

- Renal transplantation is heterotopic
- Cyclosporine is the mainstay of immuno-suppression
- In India, organ harvesting from brain dead patients is not permitted by law
- Kidney after removal is flushed with cold perfusion solution

228. After renal transplant, the commonest malignancy is: (AIIMS June 97)

- Lymphoma
- Renal cell carcinoma
- Skin cancer
- Adrenal cancer

229. Not true about right kidney is:

(DNB 2003, AIIMS June 2001)

- Right kidney is preferred over the left for transplantation
- It is lower than the left kidney
- Right renal vein is shorter than the left
- Right kidney is related to the duodenum

230. After renal transplantation, which drug is given?

(PGI June 96)

- Cyclophosphamide
- Corticosteroids
- Interferon
- Cyclosporine

231. Urinary ascites is due to:

(PGI Dec 98)

- Injury to bladder during birth
- Ureteric obstruction
- Congenital urethral atresia
- Urethral valves

232. A newborn presents with discharge of urine from the umbilicus for 3 days. Diagnosis is:

- Meckel's diverticulum
- Mesenteric cysts
- Urachal fistula
- Omphalocele

KIDNEY AND URETER ANATOMY AND PHYSIOLOGY

233. Ureters are identified during surgery by: (AIIMS 96)

- Peristalsis due to flow of urine
- Rich arterial plexus
- Relation to renal vein and artery
- Relation to lumbar plexus

234. All of the following structures cross the right ureter anatomically except: (All India 2012)

- Terminal ileum
- Vas deferens
- Genitofemoral nerve
- Right colic and ileocolic vessels

235. Ureteric constriction is seen at all the following positions, except: (All India 2002)

- Ureteropelvic junction
- Ureterovesicle junction
- Crossing of iliac artery
- Ischial spine

236. The narrowest part of the ureter is at the: (AIIMS Nov 2005)

- Ureteropelvic junction
- Iliac vessel crossing
- Pelvic ureter
- Ureterovesicle junction

237. All the following are true regarding blood supply to the kidney, except: (All India 2002)

- Stellate veins drain superficial zone
- It is a type of portal-circulation
- The renal artery divides into five segmental arteries before entering the hilum
- Its segmental arteries are end-arteries

238. The commonest site of surgical ureterovaginal fistula is:

(PGI 99)

- Below infundibulopelvic ligament
- Below uterine artery in the Mackenrodt's ligament
- Vaginal angle
- Above uterine artery

239. True about ureter is:

(AIIMS 91)

- Gonadal vessels lie anterior to it
- It lies in front of great vessels
- About 50 cm long
- Nerve supply from T8-T10
- Internal iliac artery

240. What is column of Bertini in kidney?

(APPG 2008)

- Renal tumour
- Tongue like papillary projection
- Calculus
- None

241. Ureter is diagnosed during operation by:

(All India 98)

- Venous plexus
- High arterial supply
- Peristaltic movements
- Circumference

242. The resting ureteric pressure:

(PGI June 99)

- 5–7 cm of H₂O
- 15–30 cm of H₂O
- 7–10 cm of H₂O
- 0–5 cm of H₂O

243. Left loin nephrectomy, structure not cut is:

(PGI Dec 98)

- Trapezius
- Serratus inferior posterior
- Latissimus Dorsi
- Internal oblique

244. Unilateral small smooth kidney is seen in: (Karnataka 2003)

- Reflux nephropathy
- Lobar infarction
- Renal artery stenosis
- Chronic glomerulonephritis

245. The neonatal kidney achieves concentrating ability equivalent to adult's kidney by:

- One year of age
- Eighteen months of age
- Three to six months of age
- Just before puberty

MISCELLANEOUS

246. A 60 years old male presents with hematuria at onset of micturition, cause is: (AIIMS June 99)

- Urethral stone
- Bladder tumor
- Ureteric stone
- Prostatitis

247. A 23 years old male who is otherwise normal complains of mild pain in his right iliac fossa in a waveform pattern which increases during the night and he becomes exhausted and is admitted in the hospital. On examination there is mild hematuria. Urine examination reveals plenty of RBCs, 50WBCs/hpf. Urine pH is 5.5. Most likely diagnosis is:

- Glomerulonephritis
- CA urinary bladder
- Ureteral calculus
- Cystitis

248. What is oliguria?*(JIPMER 87)*

- a. Excretion of less than 300 ml in 24 hours
- b. Excretion of less than 500 ml in 24 hours
- c. Excretion of less than 300 ml in 12 hours
- d. Excretion of less than 100 ml in 24 hours

249. Normal capacity of the renal pelvis is:*(AIIMS 87)*

- a. 7 ml
- b. 10 ml
- c. 15 ml
- d. 20 ml

250. Low and fixed specific gravity of urine is seen in:*(SGPGI 2005)*

- a. Diabetes mellitus
- b. Diabetes insipidus
- c. Chronic renal failure
- d. Acute glomerulonephritis

251. Auto nephrectomy is seen in:*(JIPMER 95)*

- a. Sickle cell anemia
- b. Renal TB
- c. Sarcoidosis
- d. Lymphoma

252. Urine incontinence is seen in all except: *(MHPGMCET 2003)*

- a. Ureterovaginal fistula
- b. Vesicovaginal fistula
- c. Ectopic ureter
- d. Urethrovaginal fistula

253. If due to a certain pathology there is marked loss of ureter, then what is best therapeutic options? *(MHSSMCET 2005)*

- a. Transureterostomy
- b. Psoas Hitch operation
- c. Intestinal segment substitute
- d. Boari's flap operation

EXPLANATIONS

RENAL AND URETERIC CALCULI

1. Ans. b. Triple phosphate (Ref: Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)

TYPES OF RENAL CALCULI

- **Calcium oxalate**
 - MC type of kidney stone (85%)^Q
 - Risk factors are hypercalciuria, hypercalcemia, hyperoxaluria
 - Have **hard, small and jagged surface**
 - On section-wavy concentric laminae
- **Uric acid stones**
 - 5-10 % of all kidney stones, MC radiolucent urinary calculi^Q, formed in **acidic urine**
 - Patients with uric acid stones may have **gout, myeloproliferative disorders** or **Lesch-Nehan syndrome** (hyperuricemia)

Uric Acid Stones Management

- Cornerstone of treatment: **Low purine diet, hydration and alkalization of urine**^Q
- **Allopurinol**^Q (Inhibits conversion of hypoxanthine and xanthine to uric acid)
- **Acetazolamide**^Q (may be added if urine pH is <6.5)

- **Struvite stones (Infection stones)**
 - Composed of **calcium, ammonium, magnesium phosphate (Triple phosphate stones)**^Q
 - Tend to grow in **alkaline urine**^Q, especially with **Proteus infection** and fill whole of the PCS, forming **staghorn calculi**^Q
 - Formed in **high urinary concentration of ammonia**
 - More common in **women**^Q (increased susceptibility for UTI)
 - Most of the **stag horn calculi** are **silent**^Q and cause **progressive destruction of renal parenchyma**^Q.
 - Increased tendency to form struvite calculi is seen in: **Foreign body** in the urinary tract (**Foley's catheter**) and **Neurogenic bladder**^Q/Bladder dysfunction/Bladder outlet obstruction.

Struvite stones Management

- Complete stone removal +Treatment of a metabolic abnormality + Correction of any anatomic abnormalities contributing to stasis
- **PCNL + ESWL (best treatment option)**^Q
- **Antibiotics** to prevent stone recurrences or growth after operative procedure
- **Acetohydroxamic acid (irreversible inhibitor of urease)**^Q decreases likelihood of precipitation
- **Low calcium, low phosphorus diet.**
- Up to 50% of patient have **stone recurrences** or UTI over 10 years follow up

- **Cystine**
 - **Extremely hard stone**, formed in **acidic urine**
 - Relatively **resistant** to fragmentation by ESWL
 - Occur in cystinuria with typical **"ground glass" appearance** with a **round smooth outline**^Q
 - Typical **benzene or hexagonal cystine crystals**^Q in urine.

Cystine Stones Management

- **Stone removal**
- To lower cystine concentration in urine (**Low methionine diet and alkalization**)^Q
- **Cystine complexing agents: D-Penicillamine**^Q and **Alpha-mercaptopropionylglycine (MPG)**^Q

- **Xanthine**
 - Seen in **xanthinuria, radioluscent**^Q
 - Stones are **smooth, brick red colored, round** and show **lamination on cross section**^Q.
 - **Management: High fluid intake** (most effective therapy) and **Allopurinol**^Q
- **Indinavir**
 - A **protease inhibitor** used in **AIDS patients**, resulting in **radioluscent calculi**^Q in 6% patients.
- **Silicate:** Associated with **long term use of antacids** containing **silica**^Q
- **Triamterene:** **Antihypertensive medication**, leading to **radioluscent**^Q stones

2. Ans. c. Indinavir

3. Ans. d. Usually seen in acidic urine
 4. Ans. b. Urinary stones (Ref: Campbell 10/e p1262-1263)

RANDALL'S PLAQUES

- Randall's plaques are soft tissue calcifications^Q found in the deep renal medulla skirting the surface of the epithelium of the papilla, where they act as nucleating elements for renal calculi or stones^Q.

5. Ans. a. Phosphate
 6. Ans. a. Ethylene glycol (Ref: Smith 17/e p248)

CALCIUM OXALATE CRYSTALS

- Calcium oxalate crystals in the urine are the most common constituent of human kidney stones, and calcium oxalate crystal formation is also one of the toxic effects of ethylene glycol poisoning^Q.
- Excessive oxalate may occur secondary to the accidental or deliberate ingestion of ethylene glycol (partial oxidation to oxalate^Q). This may result in diffuse and massive deposition of calcium oxalate crystals and may occasionally lead to renal failure.

7. Ans. b. Phosphate
 8. Ans. b. Calcium oxalate

RENAL AND URETERIC CALCULI CLINICAL FEATURES

9. Ans. a. At pelvic brim (Ref: Smith 17/e p260-270; Campbell 10/e p1287-1293, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)

RENAL CALCULI

- Peak incidence 20-40 years, more common in males^Q
- Infectious stones are more common in females^Q
- For formation of stones, a period of abnormal crystalluria is required. Urine must be supersaturated with salt of the stone forming crystal (Supersaturation and crystallization)^Q

Clinical Features

- MC symptom is pain^Q.
- The severity of pain is not related to the size of the stone^Q

- Stone in upper ureter or renal pelvis → pain referred to testis^Q
- Stone in mid ureter → referred along iliohypogastric^Q nerve to iliac fossa, mimicking appendicitis
- Stone in lower ureter → referred along ilioinguinal^Q nerve to thigh, scrotum and perineum^Q.

- Stone approaching bladder → bladder symptoms (frequency, urgency and dysuria)
- Stone in the intramural ureter → strangury^Q.
- Drug of choice for ureteric colic is diclofenac (voveran).

10. Ans. b. At pelvic brim
 11. Ans. c. Dietl's crisis (Ref: Bailey 26/e p1293, 25/e p1293)

DIETL'S CRISIS

- Intermittent hydronephrosis (Dietl's crisis): A swelling in the loin is associated with acute renal pain. Some hours later the pain is relieved and the swelling disappears when a large volume of urine is passed^Q.

12. Ans. b. Increased peristalsis of ureter to overcome the obstruction (Ref: Smith's urology 17/e p31)
- The severity and colicky nature of ureteric colic pain are caused by the hyperperistalsis and spasm of smooth muscles of the ureter as it attempts to rid itself of a foreign body or to overcome obstruction.

PAIN FROM ACUTE OBSTRUCTION OF URETER (STONE OR BLOOD CLOT)

- Ureteral pain is typically stimulated by acute obstruction (passage of a stone or a blood clot)^Q.

- **Back pain** from **renal capsular distention**^Q combined with **severe colicky pain** (due to **renal pelvic** and **ureteral muscle spasm**^Q that radiates from the costovertebral angle down toward the lower anterior abdominal quadrant, along the course of the ureter.
- The **severity** and **colicky nature** of this pain are caused by the **hyperperistalsis**^Q and **spasm**^Q of this **smooth muscle organ** as it attempts to **rid itself of a foreign body** or to **overcome obstruction**.

Stone in the upper ureter	<ul style="list-style-type: none"> • Pain radiates to the testicle^Q • Since the nerve supply of this organ is similar to that of the kidney and upper ureter (T11–12)^Q.
Stone in the middle ureter	<ul style="list-style-type: none"> • Pain is referred to McBurney's point^Q and simulate appendicitis on right side • Left side, it may resemble diverticulitis^Q or other diseases of the descending or sigmoid colon (T12, L1)^Q.
Stone in the lower ureter	<ul style="list-style-type: none"> • Pain is referred to inner side of thigh or scrotum or perineum (L1, L2)^Q
Stones at the level of orifice	<ul style="list-style-type: none"> • Symptoms of vesical irritability such as frequency and urgency^Q may occur.

13. Ans. b. Proteus
 14. Ans. b. Iliohypogastric
 15. Ans. c. Pain
 16. Ans. a. Oxalate stones (Ref: Bailey 26/e p1292, 25/e p1296)

OXALATE STONES

- Oxalate stones are **irregular** in shape and **covered with sharp projections**, which tend to **cause bleeding**^Q.
- The **surface** of the calculus is **discolored** by **altered blood**^Q.
- A **calcium oxalate monohydrate** stone is **hard** and **radiodense**^Q.

17. Ans. b. Stillness of the patient
 18. Ans. d. Diclofenac

RENAL AND URETERIC CALCULI DIAGNOSIS AND TREATMENT

19. Ans. a. PCNL (Ref: Smith 17/e p260-270; Campbell 10/e p1287-1293, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)

RENAL CALCULI

Laboratory Investigations

- **Urine:** pH, microscopic examination (RBCs, pus cells and crystalluria) and culture for splitting organisms

• Acidic urine: CCU (Calcium oxalate, Cystine, Uric acid) ^Q
• Alkaline urine: Calcium Phosphate, Struvite ^Q

Crystalluria: To determine the stone composition	
Crystal	Appearance
Calcium oxalate monohydrate	Dumbbell or hourglass ^Q
Calcium oxalate dehydrate	Enveloped or bipyramidal ^Q
Calcium phosphate (apatite)	Amorphous ^Q
Brushite	Needle shaped ^Q
Struvite	Coffin lid ^Q
Uric acid	Multifaceted, irregular plates or rosettes ^Q
Cystine	Hexagonal or benzene ring ^Q

Radiographic Investigations

- **X-ray KUB:**
 - 90% are radiopaque^Q
 - Radiolucent stones (TIXU): Triamterene, indinavir, xanthine and uric acid^Q
- **USG:** A screening tool for hydronephrosis or stone within collecting system.
- **IVP:**
 - Early films (At 1 and 5 min for promptness of contrast excretion and Any obstruction along urinary tract)
 - Delayed films (Identifies cause of delayed contrast excretion)

• **Non-contrast spiral CT^Q** is the **most sensitive investigation** for renal/ureteric calculus^Q.

- **Retrograde pyelogram (RGP):**
 - Better delineation of anatomy. Especially useful if distal ureter not visualized^Q well.
 - Excludes unsuspected additional ureteric calculi and allows assessment of coexistent ureteric disease such as stricture^Q, which may complicate the operative and post operative course.

Radionuclide evaluation

- **DMSA (Dimercaptosuccinic acid):** Renal morphology^Q (scar)
- **DTPA (Diethylene Triamine Pentacetic Acid):** To assess perfusion (Effective renal plasma flow) and function^Q (Total and differential GFR), less effective than MAG-3 for decreased renal function
- **MAG-3 (Mercapto-acetyl glycine):** Best for renal perfusion^Q (Assess renal plasma flow).

• **Metabolic workup** should be done in young patients, with recurrent calculi, multiple calculi and in nephrocalcinosis^Q, struvite stones, uric acid stones and cystine stones.

20. Ans. b. Uric acid

21. Ans. a. ESWL (Ref: Campbell 10/e p1302-1309; Bailey 26/e p1294-1296, 25/e p1297-1300)

The best treatment in this situation is PCNL. Since PCNL is not mentioned in the option, the best option is ESWL despite of size 2.5 cm, as it is preferred over other three for the management of renal stones.

MANAGEMENT OF RENAL AND URETERIC CALCULI**Indications of Conservative Treatment (for 4-6 weeks)**

(Feature of stone likely to pass spontaneously)

- Single stone ≤ 5 mm^Q
- Ureter is undilated^Q
- Stone in lower third of ureter^Q
- Evidence of downward movement^Q

Surgical Intervention

- ESWL (Extracorporeal shock wave lithotripsy)
- URS (Ureteroscopy)
- PCNL (percutaneous nephrolithotomy)
- Laparoscopic stone surgery
- OSS (Open stone surgery)

- The majority (80-85%) of simple renal calculi are treated satisfactorily with ESWL^Q.
- Rests are managed by PCNL/URS
- OSS is the least common treatment modality now days.

INDICATIONS OF OPEN STONE SURGERY

(Ref: Smith 17/e p269; Campbell 10/e p1595, 1645; Bailey 26/e p1294, 25/e p1299)

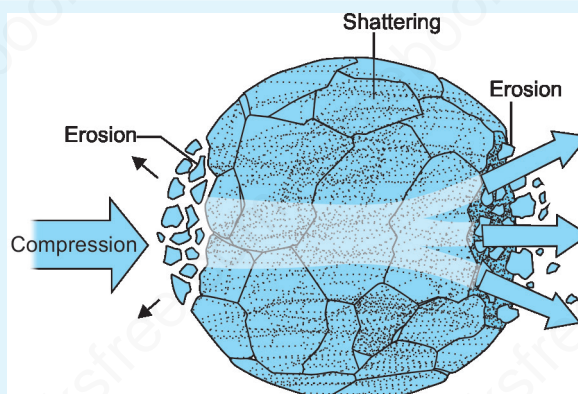
- Anatomic abnormality requiring open operative intervention (e.g. PUJO)^Q
- Nonfunctioning kidney with stone (nephrectomy)^Q

(Ref: Campbell 10/e p1380-1381, 1399-1405; Bailey 26/e p1294, 25/e p1300-1302)

TREATMENT DECISIONS BY STONE BURDEN

- Stone ≤ 2 cm: ESWL^Q
- Unless factors of stone composition, location, location or renal anatomy shift the balance towards more invasive modalities (PCNL/URS).
- Stone > 2 cm: PCNL^Q
- Stag horn calculi: (PCNL + ESWL) is TOC^Q
- Initial approach is PCNL, followed by ESWL, as an adjunct to minimize the number of repeat PCNL accesses.

22. Ans. a. Calcium oxalate monohydrate (Ref: Smith 17/e p264-268; Campbell 10/e p1380-1381; Bailey 26/e p1294, 25/e p1298-1299)



ESWL (EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY)

- High energy shock waves^Q are produced outside the patient's body, which are focused on stones with help of fluoroscopy or ultrasound.
- The change in density between the soft renal tissue and hard stone causes release of energy at the stone surface which causes "compression induced tensile cracking of stones"^Q
- Incoming shock wave result in fragmentation of stones from erosion and shattering^Q
- The stone fragments into small pieces and may pass down the ureter.
- Strongest or Gold standard lithotripter for ESWL is Dornier unmodified HM-3.^Q

- Difficult (hard) stones for ESWL: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)^Q

Factors responsible for decreasing the chances of stone free status

- Stone burden: Multiple stones, > 2 cm and staghorn calculi^Q
- (ESWL is best suited for stone < 2 cm in renal pelvis or calyces with no distal obstruction)
- Reduced clearance: Lower calyceal location, marked hydronephrosis or scarring, calyceal diverticulum or horseshoe kidney^Q.
- Stone composition:
 - Difficult: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)^Q
 - Breakable: Uric acid, struvite, Calcium oxalate dihydrate.

Contraindications of ESWL		
Absolute	Relative	
<ul style="list-style-type: none"> • Pregnancy^Q • Bleeding disorder^Q 	<ul style="list-style-type: none"> • UTI^Q • Unrelieved distal obstruction^Q • Cardiac pacemaker^Q • Uncontrolled hypertension^Q • Severe orthopaedic deformity 	<ul style="list-style-type: none"> • Weight > 300 pounds • Severe renal failure^Q • Aneurysm

Complications of ESWL

- Acute injury to the renal parenchyma leading to hematuria and edema^Q around the kidney.
- Chronic renal injury leading to accelerated rise in the systemic blood pressure, decrease in renal function and increase in rate of stone recurrence^Q.
- Lung parenchymal injury (if exposed)
- Extrasystoles
- Infection due to release of bacteria in fragment
- Steinstrasse (street of stones or columnation of stone gravel in ureter)^Q

23. Ans. b. 'J' stent drainage (Ref: 'Acute Care Surgery: Principles and Practice' (Springer) 2007/571)

- Prompt drainage of hydronephrosis by 'J' stent drainage is the single best option to manage uremia in this patient with bilateral renal calculi, to allow recovery of renal function at the earliest^Q.
- Hemodialysis may be used afterwards if renal recovery is prolonged necessitating removal of waste products^Q
- Prompt drainage of hydronephrosis by 'J' stent placement is the procedure of choice for hydronephrosis complicated with renal failure in the setting of urinary obstruction^Q.
- Prompt drainage of hydronephrosis is indicated if renal function is compromised or urinary infection (UTI) is suspected, to preserve/salvage renal function.

- Prompt drainage can be achieved by placement of a ureteral stent or through percutaneous nephrostomy^Q.

- The drainage procedure of choice in emergent situations is cystoscopy with placement of internalized double 'J' ureteral stent. This procedure has the advantage of being a completely internal drainage system^Q.
- Percutaneous nephrostomy may be used to allow urinary drainage if the stone is too impacted to allow passage of a guide wire for stent placement^Q

24. Ans. a. Hydrothorax (Ref: Smith 17/e p122, 269; Campbell 10/e p1399-1405; Bailey 26/e p1294, 25/e p1298-1299; Schwartz 10/e p1666, 9th /1472)
- PCNL done through the 11th intercostals space traverses the lower aspect of pleura and can result in significant hydrothorax from large amount of irrigative fluid.

PCNL (PERCUTANEOUS NEPHROLITHOTOMY)

- Removal of kidney stone via a 'track' developed between the surface of the skin and the collecting system of the kidney.
- The posterior approach^Q is most commonly used, through the posterior calyx rather than into the renal pelvis, as it avoids damage to the posterior branches of the renal artery^Q, which are closely associated with renal pelvis.

Indications of PCNL

- Obstructive uropathy^Q (contraindication for ESWL)
- Large volume stone (>2 cm), stag horn calculi^Q
- Other modalities failure (Ureteroscopic failure or ESWL failure)^Q
- Lower pole calyceal stone^Q
- Difficult (hard) stones for ESWL: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)^Q

Complications

- Injury to other viscera like pleura (MC)^Q, colon, spleen
- Bleeding, urinary extravasation
- Retained fragments
- Sepsis

25. Ans. d. Stone in a calyceal diverticulum (Ref: Smith 17/e p264-268; Campbell 10/e p1380-1381; Bailey 25/e p1298-1299)
26. Ans. d. Ureteroscopic retrieval (Ref: Smith 17/e p268-269; Campbell 10/e p1407-1408; Bailey 26/e p1297-1298)

URETEROSCOPY

- Ureteroscopic stone extraction is highly efficacious for lower ureteric calculi^Q.
- The use of small-caliber ureteroscopes and the advent of balloon dilatation or ureteral access sheaths have increased stone-free rates (66%-100%) dramatically.

Indications

- Lower ureteric calculi^Q
- Upper ureteric calculi of ESWL failure^Q
- Suspicion of urothelial tumor^Q (filling defect, Brush cytology)
- Ureteric dilations or DJ stents^Q
- Retrieval of foreign body^Q

Complications

- Iatrogenic injuries or ureteric perforations^Q

27. Ans. a. Endoscopic removal (Ref: Campbell 10/e p1375-1379; Bailey 26/e p1296-1298/25/e p1301-1302)

URETERIC CALCULI

Proximal and mid-ureteral Stones

- Stone ≤ 1 cm: ESWL^Q is primary approach. Ureteroscopy is preferred in failed ESWL, distal obstruction or impacted stones.
- Stone > 1 cm: Ureteroscopy^Q is primary approach. PCNL for large proximal stones or impacted calculi.

Distal ureteral stones

- Stone ≤ 1 cm: ESWL and Ureteroscopy equally successful. Ureteroscopy^Q is the primary approach
- Stone > 1 cm: Ureteroscopy^Q

Remember: For all ureteric stones, ureteroscopy is the primary approach except ≤ 1 cm proximal and mid-ureteral stones^Q.

28. Ans. d. Ureteric obstruction due to fragments in ureter

29. Ans. b. Its use for uric acid stones has caused deaths due to generation of cyanide (Ref: Smith 17/e p130; Campbell 10/e p198-199, 1380-1391)

INTRACORPOREAL LITHOTRIPSY

Techniques

- Electro hydrolytic lithotripter (EHL)
 - Narrow safety margin, may damage ureteral mucosa but **least expensive**
 - Suitable for bladder calculi^Q.
 - Successfully fragments 90% of calculi^Q
- Ultrasonic lithotripter
- Ballistic lithotripter
- Laser lithotripter (Holmium-YAG laser)
 - Ho-YAG is the **best laser source** for intracorporeal lithotripsy^Q, primarily through a **photothermal mechanism** that causes stone vaporization^Q.
 - **Most effective and versatile** with good safety margin
 - **Fragments all stones** regardless of composition. It **can cut through the metal**. So, caution must be exercised while using a basket.
 - **Potential side effect is production of cyanide^Q** when **uric acid stones** are treated. This has been reported in vitro. The clinical experience has suggested **no significant cyanide toxicity^Q**.
 - Major disadvantage is **initial high cost** of the device and the laser fibers.

30. Ans. a. Cysteamine (Ref: Harrison 18/e p3221; Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)

- Patient with cystinuria with multiple renal stones should be treated with increase urine volume (high fluid intake), alkalinization of urine, Penicillamine and tiopronin.

31. Ans. d. Uric acid, e. Xanthine

RENAL STONES

- Renal stones: 90% are radiopaque^Q
- Radiolucent stones (TIXU): Triamterene, indinavir, xanthine and uric acid^Q

32. Ans. e. 90% (Ref: Smith 17/e p261-262)

IMAGING OF URETERIC COLIC (CALCULUS)

- A plain film of the abdomen and renal ultrasound examination will **diagnose most stones^Q**.

- Spiral CT (Non-contrast CT)^Q has become the **study of choice** in emergent situations, as the **entire urinary tract** can be scanned rapidly and **without contrast injection^Q**.
 - Calculi can be **readily identified** and **distinguished** from clot or tumor^Q.
- About of 90% of calculi are radiopaque^Q (calcium, cystine).
- Excretory urography is necessary to **verify their location** within the urinary tract and also affords a **qualitative measure** of renal function.
- An acutely obstructed kidney may show only **increasing density** of renal shadow without significant radiopaque material in calices.
- A non-opaque stone (uric acid) will be seen as a **radiolucent defect** in the opaque contrast media.

33. Ans. d. Lower 1/3rd of ureter

35. Ans. c. Uric acid

37. Ans. c. High calcium intake

39. Ans. b. Phosphate

41. Ans. c. Renal stones (Ref: Bailey 25/e p1297; mededconnect.com)

34. Ans. a. Urine is always infected, b. Should be removed immediately

36. Ans. a. ESWL

38. Ans. d. Uric acid stones are resistant to ESWL

40. Ans. a. Endoscopic removal

X-RAY KUB

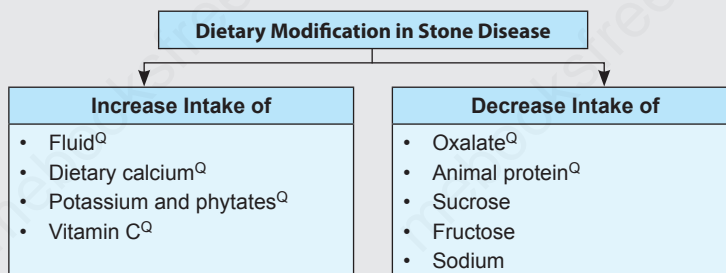
- Kidney stones should be looked **opposite** to second lumbar vertebra^Q.
- In a lateral X-ray of abdomen gallstones are **anterior** and renal and ureteric stones **overlie** the lumbar spine^Q.

Opacities on a plain X-ray that may be confused with renal calculus

- | | |
|---|---|
| <ul style="list-style-type: none"> • Calcified mesenteric LN • Gallstones or concretion in the appendix • Tablets or foreign bodies in the alimentary canal (e.g. cyclopenthiazine) • Ossified tip of the 12th rib | <ul style="list-style-type: none"> • Phleboliths: calcification in the walls of veins, especially in the pelvis • Calcified tuberculous lesion in the kidney • Calcified adrenal gland |
|---|---|

42. Ans. d. Restricted calcium intake (Ref: Harrison 18/e p 1817; Smith 17/e p271)

- A source of calcium at each meal may actually help prevent oxalate stones from forming as the calcium binds with oxalate in food and thus prevents the oxalate from being absorbed into the body^Q.



43. Ans. c. Cystine stone

44. Ans. a. Uric acid stones

45. Ans. a. Severity of pain increases with size of the calculus (Ref: Bailey 26/e p1293, 25/e p1296)

- The severity of pain is not related to the size of the stone.

URETERIC COLIC

- There is a pattern of severe exacerbation on a background of continuing pain
- Radiates to the groin, penis, scrotum or labium as the stone progresses down the ureter
- The severity of pain is not related to the size of the stone^Q
- The pain is almost invariably associated with haematuria^Q
- There may be few physical signs

46. a. Stone

- MC cause of ureteric obstruction: Stone^Q
- MC cause of ureteric colic in hematuria: Clot^Q

47. Ans. a. Holmium

48. Ans. a. Bleeding is least concerned complication

49. Ans. b. Holmium

50. Ans. b. Calcium restriction (Ref: Smith 17/e p271)

RENAL INFECTIONS

51. Ans. a. E. coli (Ref: Smith 17/e p200-201; Campbell 10/e p299-301)

EMPHYSEMATOUS PYELONEPHRITIS

- Necrotizing infection characterized by the presence of gas within the renal parenchyma or perinephric tissue^Q.
- About 80–90% of patients have diabetes^Q, rest are associated with urinary tract obstruction from calculi or papillary necrosis, more common in females
- Bacteria most frequently cultured from the urine include E. coli^Q (MC), Klebsiella pneumoniae, and Enterobacter cloacae.
- Decreased host immunity^Q is most important factor.

Clinical Features

- Triad "Fever, flank pain, and vomiting^Q" almost always present and fails initial management with parenteral antibiotics
- Pneumaturia may be present.
- The mortality rate is 19–43%^Q.

Diagnosis

- **Plain X-ray:** Gas^Q overlying the affected kidney
- **CT scan^Q** is more sensitive than USG in detecting the presence of gas^Q in the renal parenchyma

Management

- Fluid resuscitation, **prompt control of blood glucose** and **relief of urinary obstruction^Q** is essential with **parenteral antibiotics (3-4 weeks)^Q**.
- In addition, **percutaneous drainage^Q** is helpful in accelerating resolution of the infection and minimizing the morbidity and mortality of the infection.
- **Most cases** require **nephrectomy^Q**.

Prognosis

- **Poor prognostic factors:** High creatinine, low platelet, presence of renal/perirenal fluid with a bubbly/loculated gas pattern or gas in the collecting system.

52. Ans. b. Xanthogranulomatous kidney (Ref: Smith 17/e p204-206; Campbell 10/e p308)

XANTHOGRANULOMATOUS PYELONEPHRITIS

- XGP is a form of **chronic bacterial infection^Q** of the kidney
- **Most commonly** caused by **Proteus >E. coli**
- The **affected kidney** is almost always **hydronephrotic** and **obstructed^Q**.

Pathology

- In most cases, XGP occurs **unilaterally**. Severe inflammation and necrosis obliterate the kidney parenchyma. Usually **pelvis** is **not** dilated due to peripelvic fibrosis.

- It is **difficult to distinguish** XGP from **clear cell RCC** pre-operatively.
- Even **frozen section** has **difficulties to distinguish** XGP from **clear cell RCC**.

- Characteristically, **foamy lipid-laden histiocytes (xanthoma cells)^Q** are present and may be mistaken for renal clear cell carcinoma.

Clinical Features

- Flank pain, fever, chills, and persistent bacteriuria with palpable flank mass.
- A history of **urolithiasis^Q** is present in **50%** of the patients, **staghorn calculi^Q** in **80%** cases.
- Primarily occurs **unilaterally**, **azotemia** or **renal failure** is **not** seen.

Diagnosis

- **Urinalysis:** Demonstrates **WBCs** and **protein**.
- **Proteus species (MC)^Q** or **E. coli** or are commonly cultured from the urine, **one third** of patients have **no growth**, most likely because they have recently received antibiotic therapy.
- **Serum blood analysis:** **Anemia** and **hepatic dysfunction^Q** in approximately **50%** of patients.
- **CT scan** is **IOC** for XGP.
- **USG:** **Enlarged kidney** with a large **central echogenic area** and **anechoic parenchyma^Q**.

Management

- Kidney-sparing surgery (**partial nephrectomy**) is indicated XGP.
- **Nephrectomy** in cases of **extensive infection**.

53. Ans. b. Always unilateral (Ref: Smith 17/e p204-206; Campbell 10/e p303-304; Bailey 26/e p1300, 25/e p1283, 1304)

PYONEPHROSIS

- Bacterial infection of a **hydronephrotic, obstructed kidney**, which leads to **suppurative destruction** of the renal parenchyma and potential loss of renal function.
- Kidney is a **bag of pus^Q**.
- **MC cause:** **Renal stones^Q**. Others are infected hydronephrosis, acute pyelonephritis.

Clinical Features

- Mostly **unilateral^Q**, characterized by triad of **anemia**, **fever** and **swelling in loin^Q**.

Diagnosis

- USG diagnose pyonephrosis.

Management

- Immediate institution of **antibiotic therapy** and **drainage**^Q of the infected collecting system.
- Antibiotics should be started before manipulation of the urinary tract.
- In the **ill patient**, drainage of the collecting system with a **percutaneous nephrostomy**^Q tube
- **Nephrectomy** in **destroyed** or **non-functioning kidney**

- For HDN, DJ stenting and **percutaneous nephrostomy**, both are having same results but DJ stenting is less invasive.
- For pyonephrosis, **percutaneous nephrostomy** is better than DJ stenting.

(Ref: Smith 17/e p202-204; Campbell 10/e p304-305; Bailey 26/e p1301, 25/e p1305)

PERINEPHRIC ABSCESS

- Sources of perinephric abscesses are mainly **extension of cortical abscesses** or **hematogenous**^Q.
- Generally caused by *E. coli* or *Proteus*^Q species.

Clinical Features

- **High grade swinging fever**^Q, abdominal tenderness and flank mass

Diagnosis

- **Urine cultures** (positive only if communication with collecting system is present, so most are usually negative) identify causative organisms in **one-third**^Q and **blood cultures** in **half**^Q of cases
- Accurately detected on **USG** or **CT scans**.

Management

- Appropriate **antibiotic therapy**^Q. If the patient **does not respond within 48 hours** of treatment, **percutaneous drainage**^Q under CT or ultrasound guidance is indicated.
- If the abscess still does not resolve, then **open surgical drainage** or **nephrectomy**^Q may be necessary.
- Follow-up imaging is needed to confirm the resolution of the abscesses.

54. Ans. c. Pyonephrosis (Ref: P Modi, G Kadam, R Goel - Journal of Endourology, 2007)

- A **subcapsular nephrectomy** (SN) is sometimes needed to successfully **remove** the **kidney** because of the **dense perinephric adhesions** in **pyonephrosis**.

55. Ans. c. Nitrite test (Ref: Smith 17/e p196)

Sensitivity and Specificity of Urinalysis in UTI		
Tests	Sensitivity (%)	Specificity (%)
Esterase	83 (67–94)	78 (64–92)
Nitrite	53 (15–82)	98 (90–100) ^Q
Esterase or Nitrite	93 (90–100)	72 (58–91)
White blood cells	73 (32–100)	81 (45–98)
Bacteria	81 (16–99)	83 (11–100)
Any above	99.8 (99–100)	70 (60–92)

56. Ans. a. Proteus

57. Ans. d. Vesicoureteric reflux (Ref: Bailey 25/e p1304-1305)

- **Chronic pyelonephritis** is so often associated with **vesicoureteric reflux** that some feel that it is **better named “Reflux nephropathy”**. It is important cause of renal damage and death from end-stage renal failure.

GENITOURINARY TUBERCULOSIS

58. Ans. b. Hematogenous (Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301-1303, 25/e p1306-1308)

GENITOURINARY TUBERCULOSIS

- Tubercle bacilli (*M. tuberculosis*) may invade one or more organs of genitourinary tract and cause **chronic granulomatous infection**^Q.
- More common in **males**^Q (young adults of age 20-40 years)

Etiology

- *M. tuberculosis* reaches the genitourinary organs by **hematogenous route** from **lungs**^Q.
- The **primary site** is often **not symptomatic** or **apparent**^Q.

- Tubercle bacilli lodge in **periglomerular capillaries** and form **cortical granulomas**^Q after hematogenous spread from a distant focus.
- These contain **dormant bacilli** that may remain stable, but have the potential to multiply, years later producing the disease.
- **Spontaneous healing** is the **usual response**^Q.

- The development of **disease** depends on the **interaction between pathogen and immune response of host**^Q.
- In whole of genitourinary tract, **Kidney & prostate** is the **primary site of infection**^Q (hematogenous). Rest organs are involved by ascent or descent.
- Generally **testis** is **not involved**^Q.

Pathogenesis

- **Granulomas** at **renal pyramid** → Enlarge (**tubercular abscess**) → **Burst** into **PC system** and **pus discharge** in urine (sterile pyuria^Q).
- **Vesical irritability** is an **early clinical manifestation**^Q.

Complications

Stenosis of calyceal neck or pelvic ureteric junction → **Hydronephrosis** and **pyonephrosis** → **Perinephric abscess** → Kidney replaced by caseous material (**putty kidney**) → **Calcification** → **Autonephrectomy** (a calcified non-functioning kidney, representing end-stage disease)^Q.

- **Autonephrectomy** is the final result of marked parenchymal fibrosis and obstructive uropathy.
- **Scarring with stricture formation**^Q is one of the most typical lesions of tuberculosis and most commonly affects **juxtavesical portion** of ureter.
- **Inflammation** of **bladder mucosa** in early stages → **tubercle formation** (seen endoscopically as **white or yellow raised nodules**^Q surrounded by halo of hyperemia) → Mural fibrosis (**Thimble bladder**)^Q
- **Large calcifications** in the **prostate** and **beaded appearance** of **vas deferens**^Q

Clinical features

- **Earliest symptom** is **urinary frequency**^Q

- **Active tuberculosis** elsewhere in the **body** is found in **less than half** of patients with **genitourinary tuberculosis**^Q.
- In tuberculosis of epididymis, an abscess may drain spontaneously through the scrotal wall. A **chronic draining sinus** should be regarded as **tubercular** until proved otherwise.

Tuberculosis of genital tract should be considered in the presence of following situations

- **Chronic cystitis**^Q that refuses to respond to adequate treatment
- **Sterile pyuria**, **gross or microscopic hematuria**^Q
- Non-tender enlarged epididymis with **beaded** or thickened **vas**^Q
- **Chronic draining scrotal sinus**^Q
- **Induration** or **nodulation** of **prostate** and **thickening** of one or both **seminal vesicle**^Q

Diagnosis

- Diagnosis rest on **demonstration** of **tubercle bacilli** in the **urine** by **culture** or **PCR**^Q.

Urine: **Pyuria** with **acid urine**, **sterile** on ordinary culture (**Persistent pyuria without organisms** on culture means **tuberculosis** until proved otherwise), culture for tubercle bacilli from the **first morning urine sample** is positive in high percentage of patients.

- **Plain X-ray:** May show **calcified lesions** or **punctate calcifications**^Q in renal parenchyma

IVP in Tuberculosis

- **Earliest sign** is "**moth-eaten**" **calyx**^Q (Obliteration of clear cut outline of renal papilla) due to erosion.
- **Obliteration** of one or more **calyces** (caliectasis, hydronephrosis)
- **SOL** in pelvis (**TB abscess**) seen as **splaying of calyces**^Q
- **Ureteric strictures**^Q (single or multiple)
- **Shrunk bladder** with irregular wall (**Thimble bladder**)^Q
- Absence of function of kidney due to complete ureteral occlusion and renal destruction (**autonephrectomy**)^Q

- **RGP:** Extensive calcification or thickness of the ureter (**Pipe-stem ureter**)^Q, are usually associated with **pyonephrosis**.

Cystoscopy in Tuberculosis

- **Earliest sign** is **pallor**^Q around ureteric orifice.
- Other features are **tubercular ulcer** and **golf hole ureteric orifice**^Q.

- **CECT** is **IOC** for **genitourinary tuberculosis**^Q.
- **MRI:** Diffuse, radiating streaky areas of low signal intensity in the prostate (watermelon skin sign)

Treatment

- **ATT** and **Surgery** (for complications)^Q

Surgery in Genitourinary Tuberculosis

Optimal time of surgery is 3-6 weeks^Q after ATT is started.

Procedures:

- Ureteral dilatations offer **>50% chances of cure** in **ureteric strictures**^Q
- **Pyeloplasty** for **PUJ obstruction**
- **Boari operation** or **bowel interposition** for **ureteral strictures**^Q
- **Augmentation** or **substitution cystoplasty** for **bladder contracture**^Q
- **Nephroureterectomy** for **nonfunctioning kidney** (as the ureters are usually refluxing)
- **Partial nephrectomy** for **polar lesions** not responding to ATT

Indications of Surgery in Genitourinary TB

- Associated **RCC/malignancy**^Q
- **Non-functioning kidney** with **hypertension**^Q
- **Non-functioning kidney** with **totally destroyed parenchyma** or **deranged function**^Q

59. Ans. a. Intravenous urography (*Campbell 10/e p472*)

Intravenous urography: The majority of cases will show positive findings on excretory urography, the most common findings being hydrocalycosis, hydronephrosis or Hydroureter due to stricture formation. Early signs include the moth-eaten appearance of calyceal erosion and papillary irregularity. These signs are best seen on early excretory films because they are often masked by increasing density of the contrast on later films of the IVU. Cavitary lesions communicating with the collecting system are characteristic of TB.

60. Ans. a. Sterile pyuria is consistent finding

61. Ans. a. Renal papilla (*Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301, 25/e p1306-1308*)

PATHOGENESIS OF GENITO-URINARY TUBERCULOSIS

- **Granulomas** at renal pyramid → Enlarge (tubercular abscess) → Burst into PC system and pus discharge in urine (sterile pyuria)^Q.
- **Vesical irritability** is an early clinical manifestation^Q.

62. Ans. c. Tuberculosis of ureter

CYSTOSCOPY IN TUBERCULOSIS

- **Earliest sign** is **pallor**^Q around ureteric orifice.
- Other features are **tubercular ulcer** and **golf hole ureteric orifice**^Q.

63. Ans. a. Increased frequency

64. Ans. b. Bladder disease is associated with extensive renal disease, c. Ureteric involvement causes shortening of the ureters, d. Renal disease can produce changes identical to reflux nephropathy

65. Ans. d. Microscopic hematuria

66. Ans. a. Renal tuberculosis

HYDRONEPHROSIS

67. Ans. b. Analgesia SOS, c. Under observation, d. Follow up by USG (*Ref: Bailey 26/e p1289-1292, 25/e p1293-1295*)

HYDRONEPHROSIS

- Hydronephrosis is an **aseptic dilatation** of the kidney caused by **obstruction to the outflow of urine**.

Unilateral Hydronephrosis		
Extramural obstruction	Intramural obstruction	Intraluminal obstruction
<ul style="list-style-type: none"> Tumour from adjacent structures^Q, e.g. carcinoma of the cervix, prostate, rectum, colon or cecum Idiopathic retroperitoneal fibrosis^Q Retrocaval ureter^Q 	<ul style="list-style-type: none"> Congenital stenosis (PUJ obstruction)^Q Ureterocele and congenital small ureteric orifice Inflammatory stricture^Q Neoplasm of the ureter or bladder cancer involving the ureteric orifice^Q 	<ul style="list-style-type: none"> Calculus in the pelvis or ureter^Q Sloughed papilla in papillary necrosis^Q (especially in diabetics^Q, analgesic abusers^Q and those with sickle cell disease^Q) may obstruct the ureter

Bilateral Hydronephrosis	
Congenital	Acquired
<ul style="list-style-type: none"> Posterior urethral valves^Q Urethral atresia^Q 	<ul style="list-style-type: none"> BPH or CA prostate^Q Postoperative bladder neck scarring^Q Urethral stricture^Q Phimosis^Q

Pathology

- There is **calyceal dilatation** and the **renal parenchyma** is **destroyed by pressure atrophy^Q**.
- A kidney destroyed by longstanding hydronephrosis is a **thin-walled, lobulated, fluid-filled sac**.
- Urethral obstruction** tends to lead to **detrusor hypertrophy**, which can lead to **obstruction of the ureters** in their **intramural course^Q**.

Clinical Features

Unilateral Hydronephrosis
<ul style="list-style-type: none"> Unilateral hydronephrosis (commonly caused by idiopathic pelviureteric junction obstruction or calculus) is more common in women and on the right. Presenting features include the following: Mild pain or dull aching in the loin, often with a sensation of dragging heaviness made worse by excessive fluid intake. The kidney may be palpable^Q. Attacks of acute renal colic may occur with no palpable swelling. Intermittent hydronephrosis (Dietl's crisis)^Q. A swelling in the loin is associated with acute renal pain. Some hours later the pain is relieved and the swelling disappears when a large volume of urine is passed^Q.

Bilateral Hydronephrosis
<ul style="list-style-type: none"> From lower urinary obstruction symptoms of bladder outflow obstruction^Q predominate. The kidneys are unlikely to be palpable^Q because renal failure intervenes before the kidneys become sufficiently large.

Diagnosis

- Ultrasound^Q** is the least invasive means of detecting hydronephrosis and is regularly used to diagnose **PUJ obstruction** in utero.
- Excretion urography** is only helpful if there is **significant function** in the **obstructed kidney**.
- Isotope renography (DTPA scan)^Q** is the **best test** to establish that dilatation of the **renal collecting system** is caused by **obstruction**.
- Very occasionally, a **Whitaker test** is indicated.

Treatment

- The **indications for operation** are **bouts of renal pain**, **increasing hydronephrosis**, **evidence of parenchymal damage** and **infection^Q**.
- Conservation of renal tissue^Q** is the aim; nephrectomy should be considered only when the renal parenchyma has been largely destroyed.
- Mild cases** should be **followed by serial USG** and **operated upon** if **dilation is increasing^Q**.

68. Ans. d. Ureterocele

69. Ans. a. Catheterize with Foley catheter (Ref: Bailey 25/e p1316, 1349; CSDT 13/e p922)

- Catheterization is mandatory for acute urinary retention^Q**. Spontaneous voiding may return, but a **catheter** should be **left indwelling** for 3 days while detrusor tone returns.

70. Ans. b. Radioisotope scan

DIAGNOSTIC AND LABORATORY INVESTIGATIONS

71. Ans. c. Digital subtraction angiography (Ref: Bailey 26/e p1287, 25/e p1277)

- Hypertension in a young female is most likely due to renal artery stenosis, caused by fibromuscular dysplasia. DSA will show the stenosis.

RENAL ARTERY STENOSIS

- Satisfactory imaging of the renal vessels can even be achieved by digital subtraction angiography^Q after intravenous injection of contrast medium.
- Intra-arterial angiography is considered “gold standard” for diagnosis of large vessel disease^Q, usually performed simultaneous with planned intervention.

72. Ans. c. USG

- Causes of filling defect on IVP: Stone, mass, cyst^Q.
- After excretory urogram, next best investigation will be USG for lesion characterization^Q.

73. Ans. a. Allergy to the drug (Bailey 26/e p1274, 25/e p1276)

INTRAVENOUS UROGRAPHY (IVU)

- Although IVU gives excellent images of the urinary tract, its use should be restricted because in a few patients the iodine in the contrast medium may provoke a potentially life-threatening anaphylactic reaction^Q.
- Patients with a history of allergy, atopy and eczema are particularly vulnerable^Q, but severe reactions may occur without warning.

74. Ans. c. Distinguishing between non-obstructed system (Ref: Bailey 26/e p1276, 25/e p1279)

- A ^{99m}Tc-DTPA scan is particularly useful to prove that collecting system dilatation is caused by obstruction.

RADIOISOTOPE SCANNING

- Radioisotope scanning is used in particular to obtain information about function in individual renal units^Q.
- Diethyltriaminepentaacetic acid (DTPA) behaves in the kidney like inulin: it is filtered by the glomeruli and not absorbed by the tubules. Using a gamma camera, DTPA labelled with technetium-99m can be followed during its transit through individual kidneys to give a dynamic representation of renal function.
- A ^{99m}Tc-DTPA scan is particularly useful to prove that collecting system dilatation is caused by obstruction. In obstruction, radioactivity will remain in the kidney even if urine flow is stimulated by administration of a diuretic like furosemide^Q.
- Other substances [dimercaptosuccinic acid (DMSA), mercaptoacetylglycine (MAG-3) and sodium orthoiodohippurate (Hippuran)] labelled with suitable radioactive isotopes have similarly been used to investigate renal function^Q.
- Isotope bone scanning is fundamental to the staging of kidney and prostate cancers, which typically metastasise to the skeleton^Q.

75. Ans. a. Thickened bowel loop on USG (Ref: Sutton 7/e p873)

- Pseudokidney sign or target sign is USG finding of intussusception^Q.

76. Ans. a. DMSA scan (Ref: Bailey 26/e p1276-1277)

- Renal scarring or structure of kidney is best demonstrated by a DMSA scan.

Investigation of Choice	
ADPKD (Retroperitoneal Fibrosis)	CT scan ^Q
Medullary Sponge Kidney	IVP ^Q
VUR	MCU ^Q
Retrocaval ureter	MRI ^Q
PUJ Obstruction	DTPA scan ^Q
Renal structure or surface	DMSA scan ^Q

77. Ans. d. X-ray diffraction (Ref: www.imaging.robarts.ca/.../2005pmb50)

X-RAY DIFFRACTION

- The **X-ray diffraction** is dedicated to **materials identification** and characterize through single crystal and power X-ray diffraction analysis.
- Monoenergetic X-ray diffraction (XRD) analysis is an **established standard** for the assessment of **urinary stone composition**^Q.
- For the **precise determination** of true stone composition, x-ray diffraction analysis has often been the **method of first choice**^Q.

78. Ans. b. Micturating cystourethrogram

79. Ans. a. Kidney (Ref: *Smith 17/e p51; Campbell 10/e p96*)

Clinical significance of different casts	
1. Hyaline casts	<ul style="list-style-type: none"> • A normal constituent^Q of urine and has no attached significance^Q • Tom Horsfall protein^Q is protein secreted by epithelial cells of loop of henle. This protein may be excreted as Hyaline cast^Q
2. RBC cast	<ul style="list-style-type: none"> • Are suggestive of glomerular injury^Q or acute glomerulonephritis
3. WBC casts	<ul style="list-style-type: none"> • Are suggestive of interstitial injury and may be seen in interstitial nephritis^Q • WBC cast with bacteria indicate pyelonephritis^Q
4. Brood granular casts	<ul style="list-style-type: none"> • Are seen in CRF^Q and suggests interstitial fibrosis and dilatation of tubules.
5. Pigmented muddy brown granular casts	<ul style="list-style-type: none"> • Are suggestive of ischemic or nephrotoxic injury^Q (Tubular Necrosis)

80. Ans. d. Graphic representation of radioactivity of kidneys

81. Ans. c. Chronic obstructive nephropathy (Ref: *Wolfgang 2nd/550*)

Cortical Rim Nephrogram is seen in	
<ul style="list-style-type: none"> • Acute total main renal artery occlusion^Q • Renal vein thrombosis^Q 	<ul style="list-style-type: none"> • Acute tubular necrosis^Q • Severe chronic urinary obstruction^Q

• Rim and ball nephrogram on IVP is seen in **chronic obstructive nephropathy**^Q.
 • Rim sign is seen in **chronic hydronephrosis**^Q.

82. Ans. a. Micturating cystourethrogram

Procedure	Mean effective dose (mSv) value
X-ray abdomen	0.7
Intravenous urogram (6 films)	2.5 ^Q
MCU	1.2 ^Q
Cystography	1.8
Lithotripsy	1.3
Nephrostomy	3.4 ^Q
PCNL	4.5
Ureteric stenting	4.7
CECT abdomen	10 ^Q
Renal angiogram	2 to 30
Kidney stent insertion	12.7

83. Ans. a. Stone removal, b. Ureteral obstruction, c. Anterograde renography, d. Renal tumor resection (Ref: Bailey Bailey 26/e p1281, 25/e p1283; Campbell 9/e p689)

- For HDN, DJ stenting and percutaneous nephrostomy, both are having same results but DJ stenting is less invasive^Q.
- For pyonephrosis, percutaneous nephrostomy is better than DJ stenting^Q.

PERCUTANEOUS NEPHROSTOMY

- Percutaneous nephrostomy is occasionally essential, if not life saving, in the treatment of acute or chronic upper urinary tract obstruction^Q.
- It is the first step in obtaining antegrade access to the kidney^Q for various procedures.

Indications of percutaneous nephrostomy

- | | |
|--|--|
| <ul style="list-style-type: none"> • Acute or chronic upper urinary tract obstruction^Q in which access to the kidney is impossible from the lower urinary tract • Creatinine level is rising above the reference range^Q and the urine cannot be drained through the ureter. • Renal pelvis disorders (UPJ obstruction, horseshoe kidneys, ureter duplex, ureter fissures, double renal collecting systems)^Q • Hydronephrosis in renal transplant allografts^Q • Treatment of staghorn calculi and large or lower-pole kidney stones^Q | <ul style="list-style-type: none"> • Contraindications to ESWL^Q • Stones or tumors associated with distal obstruction or a foreign body^Q that cannot be removed through the ureter • When rapid dilation of the nephrostomy tract is required^Q • To diagnose ureteral obstruction, filling defects, and anomalies via antegrade radiography • Tumors, such as sarcomas, ovarian tumors, and other retroperitoneal tumors |
|--|--|

84. Ans. a. Hydronephrosis

85. Ans. d. Pyonephrosis

BENIGN RENAL TUMORS

86. Ans. c. Bleeding is self limited d. Nephrectomy is the treatment of choice, (Ref: Smith 17/e p328-329; Campbell 10/e p1498-1501, 9/e p1578-1580; Bailey 26/e p1303, 25/e p1308)

ANGIOMYOLIPOMA

- AML is a **benign** clonal neoplasm consisting of varying amounts of **mature adipose tissue, smooth muscle** and **thick-walled vessels^Q**

- Approximately 20%-30% are found in patients with **tuberous sclerosis (TS)^Q**
- AML in TS is more likely to be **bilateral & multicentric**, presents with **accelerated growth rates & symptomatic presentation^Q**

- Who do not have TS (70-80%), pronounced **female predominance**, present **later** during 5th or 6th decade^Q
- **Massive retroperitoneal hemorrhage** from AML (**Wunderlich's syndrome^Q**) is seen in 10% of patients. It's the most significant and feared complication.
- **Pregnancy** appears to **increase the risk of hemorrhage^Q** from AML

Diagnosis

- **CT scan:** The **presence of fat^Q** within a renal lesion virtually **excludes the diagnosis of RCC** and is considered **diagnostic of AML**.
- **Lack of calcification^Q**

- **USG:** Well circumscribed, **highly echogenic lesion**, often associated with **shadowing**.
- **Angiography:** **Aneurysmal dilation^Q** is found in 50% of AMLs
- Positive immunoreactivity for **HMB-45^Q**, is **characteristic** for AML (used to differentiate AML from sarcoma)

Treatment

- **Asymptomatic AML upto 4 cm:** **Follow up** with imaging at 6-12 months.
- **Symptomatic or > 4 cm:** Intervention is required.
 - **Nephron sparing approach** for small symptomatic AML by selective **embolization^Q** (most preferred) or **partial nephrectomy**
 - **Total nephrectomy** for larger lesions or **life threatening hemorrhage^Q**

87. Ans. b. Renal oncocytoma (Ref: Smith 17/e p328; Campbell 10/e p1496-1498, 9/e p1577-1578)

ONCOCYTOMA

- Represents 3–7% of all solid renal masses
- Most renal oncocytomas **cannot be differentiated** from **eosinophilic malignant RCC**^Q by clinical or radiographic means

Pathology

- In grossly, tumors are light brown or tan, **homogeneous**, and **well circumscribed**, not truly encapsulated
- A **central scar** without prominent necrosis or hypervascularity.
- Ultrastructurally, **packed with numerous large mitochondria**, which contributes to their **distinctive staining characteristics**^Q

Diagnosis

- CT scan: Central stellate scar^Q
- Angiography: Spoke-wheel pattern^Q of feeding arteries
- MRI: well-defined capsule, central stellate scar, and distinctive intensities on T1 and T2 images

Treatment

- A **nephron-sparing approach**^Q is preferred.

Central Stellate Scar is seen in

- | | |
|--|---|
| <ul style="list-style-type: none"> • FNH^Q • Fibrolamellar HCC^Q | <ul style="list-style-type: none"> • Serous cystadenoma^Q (pancreas) • Renal oncocytoma^Q |
|--|---|

RENAL CELL CARCINOMA: TYPES

88. Ans. d. Chromophobe cell carcinoma (Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 26/e p1304-1305, 25/e p1308-1311)

CLASSIFICATION OF RCC

- **Clear cell carcinoma:**
 - MC type of RCC, mainly sporadic^Q.

- Both sporadic and familial cases are associated with **loss of sequence on chromosome 3** either by **translocation (3:6, 3:8, 3:11)** or **deletion**^Q.
 - This region harbors the **VHL gene**^Q
 - Arise from **proximal tubular epithelial cells** particularly of **cortex**^Q.
 - Occurs as **solitary unilateral lesion**^Q, often a pseudocapsule is formed around tumor by compression of surrounding tissue.
 - Tumor cells are **clear** and contain **glycogen & lipids**^Q.
 - Most are **well differentiated**^Q.
- **Papillary carcinoma:**
 - Characterized by **papillary growth pattern**^Q.

- MC cytogenetic abnormalities are **trisomies 7, 16, and 17**^Q.
 - Loss of 18 in sporadic form, trisomy 7 in familial form.
 - This is due to **mutated MET gene** on chromosome 7^Q.
 - **Arise from DCT**^Q, can be **multifocal** and **bilateral**^Q
 - Typically **hemorrhagic** and **cystic**.
 - Papillary carcinoma is the **MC type** of RCC in patients with **dialysis associated cystic disease**^Q.
 - Composed of **cuboidal** and **low columnar cells**^Q.
 - **Psammoma bodies** may be present.
- **Chromophobe renal carcinoma:**
 - Represent 5% of RCC, composed of cells with **prominent cell membrane** and **eosinophilic cytoplasm** with a **halo around nucleus**.
 - Relative **transparent cytoplasm** with a **fine reticular pattern** described as 'Plant cell' appearance.
 - Associated with **best prognosis**

- These tumors exhibit **multiple chromosome loss** and **extreme hypodiploidy**^Q.
 - Loss of multiple chromosomes **1^Q, 2^Q, 6, 10, 13, 17, 21 and Y**^Q.
 - Arises from **intercalated cells** of **collecting duct**^Q.
 - Composed of **pale eosinophilic cells** often with a **perinuclear halo**^Q.

- **Collecting duct (bellini duct) carcinoma:**
 - **Rarest type** of RCC^Q, composed of malignant cells enmeshed within a prominent fibrotic stroma typically in medullary location.
 - Arise from **collecting duct cells** in the **medulla**^Q.
 - Has got **very aggressive course**^Q.
- Remember: **Medullary cell carcinoma** is seen **almost exclusively** in association with **sickle cell trait**.

RENAL CELL CARCINOMA

- **MC type** of RCC: **Clear cell carcinoma**^Q
- **MC type** seen with **dialysis associated cystic disease**: **Papillary carcinoma**^Q
- **Exclusively** associated with **sickle cell trait**: **Medullary cell carcinoma**^Q
- **Best prognosis**: **Chromophobe carcinoma**^Q

89. Ans. a. Mutated VHL gene is associated with clear cell carcinoma, c. Extreme hypodiploidy occurs

90. Ans. a. Clear cell type

91. Ans. d. Monosomy of 1 and Y (-1, -Y) (Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 25/e p1308-1311)

- These tumors exhibit **multiple chromosome loss** and **extreme hypodiploidy**^Q.
- Loss of multiple chromosomes **1^Q, 2^Q, 6, 10, 13, 17, 21 and Y^Q**.

92. Ans. c. von-Hippel Lindau (VHL) syndrome

93. Ans. a. PCT (Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 25/e p1308-1311)

RENAL CELL CARCINOMA CLINICAL FEATURES, PARANEOPLASTIC SYNDROMES

94. Ans. None (Ref: Smith 17/e p329-339; Campbell 10/e p1419-1491; Bailey 26/e p1304-1307, 25/e p1308-1311)

RENAL CELL CARCINOMA (GRAVITZ TUMOR, HYPERNEPHROMA, INTERNIST'S TUMOR, RADIOLOGIST'S TUMOR)^Q

- **MC malignant tumor** of adult kidney and **most lethal**^Q of all malignancies
- More common in **males**, in 6th and 7th decade
- Majority are **sporadic**
- Hereditary variants are **VHL syndrome**, **Hereditary clear cell carcinoma** and **Hereditary papillary carcinoma**^Q
- Tumor usually involve **upper pole**^Q

Risk Factors

- **Most significant risk factors** are **smoking** and **tobacco chewing**^Q
- Other risk factors are obesity, hypertension, exposure to **Asbestos**, petroleum products and **cadmium**, chronic renal failure (specially due to **analgesic nephropathy**)^Q

Spread

- Characteristic feature of RCC is tendency to **invade renal vein**. Further extension produces a **continuous cord of tumor** in IVC and even in **right side of heart**^Q.
- **MC route** is **hematogenous**^Q

- MC sites of distant metastasis are **lungs (cannon ball deposits and pulsating secondaries)**^Q > bone > liver > brain.

- **Lymphatic spread** occurs when tumor extends beyond renal capsule.

Notable features of RCC

- Encapsulated in spite of being malignant (**pseudocapsule**)
- **Spontaneous regression**^Q
- **Refractoriness** to cytotoxic agents^Q
- Response to **biological response modifiers** (IL-2 & IFN-alpha)^Q
- **Prolonged period of stable disease**^Q

Clinical Features

- Classical triad of **gross hematuria, abdominal mass & pain** is seen in 10% cases^Q (**Too late triad**)
- **MC and consistent presentation** is **hematuria**^Q.

- Other symptoms are fever, weight loss, malaise, **acute and non-reducing varicocele, lower limb edema** due to IVC obstruction.

RCC: Paraneoplastic Syndromes (20%)

- **Raised ESR:** MC paraneoplastic manifestation^Q
- **Hypercalcemia:**
 - Due to production of **PTH-rp^Q**
 - **Only paraneoplastic syndrome** in which **medical therapies** are proven useful.
- **Hypertension^Q** (Renin production from tumor)
- **Polycythemia^Q** (Erythropoietin production from tumor)
- **Stauffer's syndrome:**
 - **Non-metastatic hepatic dysfunction^Q** due to raised **IL-6^Q** leading to **increased ALP, PT and bilirubin**
 - Hepatic function **normalizes after nephrectomy^Q**
- Others are: **Cushing syndrome**, hypoglycemia, anemia, gynecomastia, amenorrhea

Diagnosis

- **Diagnostic IOC:** CT (95% accurate)^Q
- **MRI** is **most accurate** non-invasive investigation for detecting **tumor thrombus** in **renal vein** or **IVC**. **Distinguishes tumor thrombus** from **bland thrombus^Q**
- **Inferior venocavogram^Q** is **most sensitive and specific** but **invasive** means to detect involvement of **IVC**.

- **Renal arteriography** is done before **renal sparing surgery** (partial nephrectomy), but 3-D helical CT is also sufficient.
- Specific **plain X-ray** finding is **central calcification^Q**.

FNAC is not routinely done in RCC, indications are:

- | | |
|---|---|
| <ul style="list-style-type: none"> • Suspected secondaries^Q • Suspected lymphoma^Q | <ul style="list-style-type: none"> • Clinical suspicion of renal abscess^Q • To prove pathological diagnosis in disseminated or unresectable disease^Q |
|---|---|

95. Ans. c. More common in female 96. Ans. b. Lungs

97. Ans. a. Renal cell carcinoma 98. Ans. d. All

99. Ans. a. Seminoma testis, c. Hypernephroma

- **Cannon-Ball pulmonary metastases** are **characteristic feature of RCC and testicular carcinoma**. As a rule, RCC produces spherical or round cannon-ball metastases.

100. Ans. c. von-Hippel Lindau disease 101. Ans. d. Lower pole involvement

102. Ans. a. Invasion of renal vein means inoperability

103. Ans. d. Invasion of renal vein is contraindication for surgery, b. Associated with anemia and low ESR

104. Ans. c. More common in female 105. Ans. c. Renal cell carcinoma

106. Ans. None 107. Ans. None > d. Cushing syndrome

- Cushing syndrome is the least common among the given options.

108. Ans. a. Hematuria

109. Ans. c. Hematuria

RENAL CELL CARCINOMA DIAGNOSIS AND TREATMENT

110. Ans. b. IVC involvement indicates inoperability (Ref: Smith 17/e p329-339; Campbell 10/e p1419-1491; Bailey 26/e p1304-1307, 25/e p1308-1311)

RENAL CELL CARCINOMA

Prognostic factors

- **Pathologic stage^Q** is single **most important** prognostic factor
- **Lymph node involvement** is a **poor** prognostic factor

Staging and grading

- **TNM** (preferred) and **Robson's^Q** staging are used for RCC.
- **Fuhrman^Q** histological system is used for **grading**.

Treatment

Localized RCC

- TOC is **open radical nephrectomy**^Q
- Chemotherapy and radiotherapy is not effective

- Patient with **Stauffer's syndrome** are also candidate for **radical nephrectomy**^Q.
- **Radical nephrectomy** or **debulking** is done for **cytoreduction** in both **locally advanced** and **metastatic RCC**^Q.

Indications of nephron sparing surgery

- **Bilateral RCC** or **VHL syndrome**^Q
- RCC involving a **solitary functioning kidney**^Q
- Unilateral carcinoma and a functioning opposite kidney affected by a condition that might threaten its future function (e.g. RAS)
- Low stage or **≤ 4 cm RCC**^Q at any location

Locally Advanced and Metastatic RCC

- **Sunitinib** is the **first line treatment** for **metastatic RCC** (response rate-31%)^Q
- Combined **IL-2** and **IFN-alpha** is the **2nd line treatment** for **metastatic RCC** (response rate:15%)^Q
- Chemotherapy with **vinblastine**^Q, as it is single most effective agent
- **Removal of thrombus** should be considered in **renal or IVC extension**^Q
- **Radiotherapy** for **symptomatic bone metastasis**^Q

7th AJCC (2010) TNM Staging for Renal Cell Carcinoma

T: Primary tumor		N: Regional lymph nodes
T1a: Tumor ≤ 4 cm and confined to the kidney		N0: No regional lymph nodes metastasis
T1b: Tumor > 4 cm and ≤ 7.0 cm and confined to the kidney		N1: Metastasis in regional lymph node
T2a: Tumor > 7 cm but ≤ 10 cm and confined to the kidney		
T2b: Tumor > 10 cm and confined to the kidney		
T3a: Tumor grossly extends into renal vein or its segmental (muscle containing) branches , or tumor invades perirenal and/or renal sinus fat but not beyond Gerota's fascia		M: Distant metastases
		M0: No distant metastasis
		M1: Distant metastasis present
T3b: Tumor grossly extends into vena cava below diaphragm		
T3c: Tumor extends into the vena cava above the diaphragm or invades the wall of the vena cava		
T4: Tumor invades beyond Gerota's fascia (including contiguous extension into ipsilateral adrenal gland)		

Stage I	Stage II	Stage III	Stage IV
T1N0M0	T2N0M0	T1-2 N1 M0 T1 N0-1 M0	T4 anyN M0 AnyT anyN M1

111. Ans. d. Pathological staging
112. Ans. a. Partial nephrectomy
113. Ans. a. Radiosensitive
114. Ans. c. Right radical nephrectomy and left partial nephrectomy
115. Ans. a. Transperitoneal
116. Ans. c. Renal vein
117. Ans. b. Chromosome 3
118. Ans. a. Transitional cell carcinoma
119. Ans. c. Elevated ESR
120. Ans. a. Partial nephrectomy
121. Ans. c. Keeping fascia back in place (Ref: Smith 17/e p336; Campbell 10/e p1450)

- The prototypical concept of **Radical nephrectomy** encompasses the basic principles of **early ligation of the renal artery and vein**, **removal of the kidney** with primary **dissection external to the Gerota's fascia**, **excision of the ipsilateral adrenal gland**, and **performance of a complete regional lymphadenectomy** from the **crus of the diaphragm** to the **aortic bifurcation**^Q.
- It has been well demonstrated that **removal of the ipsilateral adrenal gland** is **not routinely necessary** in the absence of radiographic adrenal enlargement **unless the malignant lesion extensively involves the kidney**, is **locally advanced**, or is **located in the upper portion** of the kidney **immediately adjacent to the adrenal gland**^Q.

RADICAL NEPHRECTOMY

- Radical nephrectomy is the **primary treatment for localized RCC**.
- Its goal is to achieve the **removal of tumor** and to take a **wide margin of normal tissue**.
- **Radical nephrectomy** encompasses:
 - Basic principles of **early ligation** of the **renal artery and vein**^Q (Artery followed by vein) First vein is incircled then artery is ligated.
 - **Removal of the kidney** with primary **dissection external to the Gerota's fascia**^Q
 - **Excision of the ipsilateral adrenal gland**^Q
 - Performance of a **complete regional lymphadenectomy** from the **crus of the diaphragm** to the **aortic bifurcation**^Q.

WILM'S TUMOR

122. Ans. b. Abdominal lump (Ref: Devita 9/e p1766-1769; Nelson 18/e p2140; Smith 17/e p339-343; Campbell 10/e p3714-3722; Bailey 26/e p1304, 25/e p1308)

WILM'S TUMOR

- Wilm's tumor: **MC primary renal tumor of childhood (2-5 years)**^Q.
- Wilm's tumor: **2nd MC malignant abdominal tumor in children (MC is neuroblastoma)**.
- Arise from kidney, composed of **three elements- Blastema, Epithelium and Stroma**^Q. (BESt)
- **MC presenting feature is asymptomatic abdominal mass or swelling**^Q.
- Mostly **unilateral**.

- Characterized by **triad of abdominal mass, fever and microscopic hematuria**^Q.

- Fever typically resolve after tumor resection

Associated malformations

- **WAGR Syndrome**^Q: It consists of **aniridia, genital anomalies and mental retardation**. The risk of **Wilm's tumor is increased by 33%** in this syndrome^Q. Associated with **WT-1 gene deletion** located on chromosome^Q 11p 13
- **Denys-Drash Syndrome**^Q: It consists of **gonadal dysgenesis** (Male pseudohermaphroditism), **nephropathy** leading to **renal failure**. Majority of patients with this syndrome **have renal failure**.
- **Beckwith-Wiedemann Syndrome**^Q: It consists of **enlargement of body organs, hemi-hypertrophy, renal medullary cysts and abnormal large cells in adrenal cortex**, macroglossia, omphalocele, hepatoblastoma. Associated with **WT-2 gene deletion** located on chromosome 11p 15.5.

Diagnosis

- **USG (first investigation)**^Q or CT abdomen for staging.
- **MRI is superior** to other imaging modalities in **delineating nephroblastomatosis elements**.
- **Calcification** tends to be more **crescent shaped, discrete and peripheral**^Q in comparison of finely stippled calcification of neuroblastoma.

Treatment

- **Surgical excision (transperitoneal radical nephrectomy)** is treatment of choice.
- **Routine exploration of contralateral kidney is not necessary** if imaging is satisfactory and doesn't suggest bilateral process.

- In unfavorable histology, **Radiation therapy** should be **started within 10 days**^Q after nephrectomy, **Chemotherapy** should be **started 5 days** after surgery^Q.

- **Chemotherapy: VCD** (Vincristine + Cyclophosphamide + Doxorubicin or dactinomycin)
- **Whole lung irradiation** is recommended for **pulmonary metastasis**.

Preoperative treatment should be considered

- | | |
|--|---|
| <ul style="list-style-type: none"> • Solitary kidney^Q • Bilateral^Q renal tumors • Tumor in horse shoe kidney^Q | <ul style="list-style-type: none"> • Tumor thrombus in IVC above the level of hepatic veins^Q • Respiratory distress due to metastatic^Q disease |
|--|---|

Prognosis

- The **histology**^Q of Wilm's tumor and **tumor stage** is identified as most important **determinant of prognosis**^Q (Histology > Stage).

Pediatric Tumors

• MC malignant tumor of infancy	Neuroblastoma ^Q
• MC extracranial solid tumor in children	
• MC abdominal malignancy in children	
• MC primary malignant renal tumor of childhood	Wilm's tumor ^Q
• MC renal tumor of infancy	Congenital mesoblastic nephroma ^Q
• MC soft tissue tumor in infants and children	Rhabdomyosarcoma ^Q

• MC solid tumor of childhood	Brain tumor ^Q
• MC cancer of childhood	Leukemia ^Q (30%) > Brain tumors ^Q (22%)

123. Ans. a. Bone metastasis
 124. Ans. c. Histology
 125. Ans. a. Within 10 days
 126. Ans. c. Same location
 127. Ans. c. Abdominal mass
 128. Ans. a. Hematuria, b. Mass abdomen, d. Fever
 129. Ans. c. Hematuria almost always present
 130. Ans. b. Less than 1 year
 131. Ans. a. Preoperative use of actinomycin D
 132. Ans. b. Lungs
 133. Ans. b. International society of Pediatric Oncology (SIOP) (Ref: Devita's 8/e p2051, Schwartz 10/e p1638-1639, 8/e p1509)

The postchemotherapy based staging system is the 'SIOP' staging system developed by the International society of oncology. Two Staging Systems are currently being used for the staging of Wilm's Tumor.

Prechemotherapy Staging System	Postchemotherapy Staging System
<ul style="list-style-type: none"> Developed by the National Wilm's Tumor staging Group (NWTSG - Staging system) This staging system is widely used in North America and Canada 'NWTSG' approach involves employment of 'primary surgery'. Chemotherapy with or without Radiation therapy is given after surgery Staging is done at time of surgery (Prechemotherapy) 	<ul style="list-style-type: none"> Developed by the International Society of Pediatric Oncology (SIOP - Staging system) This staging system is widely used in Europe 'SIOP' approach involves employment of preoperative chemotherapy without histological confirmation of Wilm's tumor. Primary chemotherapy for all patients regardless of extent Staging is done at time of surgery (Postchemotherapy)

134. Ans. c. Arthrogryposis multiplex congenita
 135. Ans. b. Open nephroureterectomy (Ref: Sabiston 18/e p2082)

- The treatment of choice for stage I Wilm's tumor is transperitoneal radical nephrectomy (radical nephroureterectomy)^Q followed by chemotherapy with or without radiotherapy depending upon tumor histology.

136. Ans. c. 11 p13

TUMORS OF RENAL PELVIS

137. Ans. a. Transitional cell carcinoma (Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2nd/244-245; Campbell 10/e p1516-1524; Bailey 25/e p1311)

CARCINOMA RENAL PELVIS

- Transitional cell carcinoma** accounts for **90% of upper urinary tract cancers^Q**.
- Urothelial cancer often presents as a **widespread urothelial abnormality**: Patients with a single upper-tract carcinoma are at risk for developing **bladder carcinoma (30-50%)^Q** and **contralateral upper urinary tract carcinoma (2-4%)**.
- More common in **males**

Etiology

- Smoking^Q**
- Excessive analgesic (Phenacetin) intake^Q**
- Industrial dyes or solvents^Q**
- Balkan's nephropathy^Q**

Clinical Features

- Painless gross hematuria (MC)^Q**, flank pain, irritative voiding symptoms

Diagnosis

- Ureteroscopic brush cytology for malignant cells^Q**
- IVP showing radioluscent intraluminal filling defects^Q**

- CT urography** is IOC for evaluation of **upper urinary tract^Q**
- Ureteral tumors are often characterized by **ureteral dilation below the site of the lesion**, creating the appearance of a **"goblet"** (better appreciated on RGP)^Q
- Bergman sign^Q**: A ureteral catheter passed upto ureter may coil distal to the ureter

Treatment

- Nephroureterectomy** with a cuff of bladder^Q.
- Periodic follow up with cystourethroscopy as **risk** for developing **bladder carcinoma (30-50%)** and **contralateral upper urinary tract carcinoma (2-4%)^Q**.

138. Ans. b. Pelvic calculus

139. Ans. b. Retrograde pyeloureterography (Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2nd/244-245; Campbell 10/e p1516-1524; Bailey 26/e p1307, 25/e p1311)

- **Goblet sign** and **Stipple sign** describe the appearance of ureteral dilation below the site of an intraluminal ureteral filling defect, best seen at retrograde pyelography (RGP)^Q.
- The **Stipple sign** refers to the pointillistic end-on appearance^Q on IVP or RGP of contrast material tracking into the interstices of a papillary lesion.
- Because maturity of TCC have a papillary configuration, presence of this sign should raise the suspicion of TCC, while the **Stipple sign** is best seen in large papillary bladder tumors^Q, it can occur anywhere in urothelial tumor, which expresses papillary architecture.

140. Ans. d. Transitional carcinoma of pelvis extending till ureter

RENAL TRAUMA

141. Ans. a. Urgent IVP is indicated (Ref: Smith 17/e p281-286; Campbell 10/e p1169-1178; Bailey 26/e p1286-1288, 25/e p1290-1291)

RENAL INJURIES

- The kidney is the most commonly injured part of the urinary tract^Q
- MC cause of blunt renal injury is motor vehicle accident^Q.
- Hematuria is the best indicator^Q of traumatic urinary system injury.
- More than 80% of patients sustaining penetrating renal injuries have other intra-abdominal injuries^Q.
- Blunt renal injuries are generally divided into minor and major injuries.
- Minor injuries account for approximately 85%^Q of cases.

Penetrating wounds causing small parenchymal injuries are generally treated by débridement, primary repair, and drainage^Q.

- Injuries involving the hilum are seldom repaired primarily^Q, and in most circumstances total nephrectomy is necessary.

Imaging studies

Contrast enhanced CT is the IOC for Renal Injuries^Q

Indications

- Gross hematuria^Q
- Microscopic hematuria with hypotension^Q anytime during initial resuscitation

- IVP should be done to see the function of the opposite kidney^Q
- Arteriography is used to define arterial injuries suspected on CT or to localize arterial bleeding that can be controlled by embolization^Q.

MANAGEMENT

Non-operative

- Most (>95%) of renal injuries can be managed non-operatively^Q.
- Significant renal injuries (Grade II–V) are found only in 5% of renal trauma.
- A hemodynamically stable patient with an injury well staged by a CT scan can usually be managed without renal exploration^Q. Hospital admission, bed rest, vital monitoring and repeated CT scan is required.

Renal exploration in Injuries

- Renal exploration should be done by transabdominal approach in order to have a control on the renal vessels first^Q.

Absolute indications	Relative indications
<ul style="list-style-type: none"> • Persistent renal bleeding^Q • Expanding or pulsatile perirenal hematoma^Q 	<ul style="list-style-type: none"> • Urinary extravasation • Non viable tissue (>20% necrosis) • Segmental arterial injury

Indication of Nephrectomy

- Hemodynamically unstable patient, with low body temperature and poor coagulation, with a normal contralateral kidney^Q.
- Extensive renal injuries^Q when the patient's life would be threatened by an attempt at renal repair.
- Already poorly functioning hydronephrotic kidney^Q with continuous bleeding

(Ref: Smith 17/e p286; Campbell 10/e p1178, 1203)

COMPLICATIONS AFTER RENAL TRAUMA

- **Complication rate** after renal trauma is 3–10%^Q
- **Urinoma** is the **MC complication**^Q after renal trauma
- **Delayed bleeding** usually occurs **within 1–2 weeks**^Q after injury

Early Complications	Late complications
<ul style="list-style-type: none"> • Urinoma, delayed bleeding • Urinary fistula, abscess • Hypertension 	<ul style="list-style-type: none"> • Hydronephrosis, pyonephrosis • Stone formation, AV fistula • Delayed hypertension

Grade	Type	Description
I	Contusion	Microscopic (>5 RBCs/HPF) ^Q or gross hematuria, urological studies normal
	Hematoma	Subcapsular , nonexpanding without parenchymal laceration.
II	Hematoma	Nonexpanding perirenal hematoma, confined to renal retroperitoneum
	Laceration	<1 cm parenchymal depth of renal cortex without urine extravasation ^Q .
III	Laceration	>1 cm parenchymal depth of renal cortex without collection system rupture or urinary extravasation ^Q
	Laceration	Parenchymal laceration extending through collecting system ^Q
IV	Vascular	Main renal artery or vein injury with contained hemorrhage
	Laceration	Completely "Shattered kidney" ^Q
V	Laceration	
	Vascular	Avulsion of renal hilum , devascularising the kidney.

142. Ans. c. Exploration indicated in all cases

143. Ans. b. Uremia

144. Ans. b. Open Gerota's fascia and explore proximal renal vessels (Ref: Smith 17/e p285; Campbell 10/e p1172–1174)

The correct option should be "take the control or explore proximal renal vessels before opening Gerota's fascia", to avoid excessive intra-operative bleeding.

Excretory Urography (IVU or IVP)- Campbell 10/e p1172

- Historically, **excretory urography** was the most commonly used modality to evaluate genitourinary injuries. **Largely replaced by CT**, a **limited role** includes the intraoperative "single-shot" IVP. The **indications are uncommon**, but when the surgeon encounters an unexpected **retroperitoneal hematoma** surrounding a kidney during abdominal exploration, the study can provide essential information^Q.
- The **main purpose** of the one-shot IVP is to assess the presence of a functioning contralateral kidney and to radiographically stage the injured side^Q.
- If **findings are not normal or near normal**, the kidney should be explored to complete the staging of the injury and reconstruct any abnormality found^Q.

- In the given problem, patient is having a **non-pulsatile hematoma**, which is **not an indication** for surgical exploration.
- **On table IVU** was done to see the **function of contralateral kidney**, the function of opposite kidney should be ascertained before planning nephrectomy in any trauma patient.
- **Angiography** is **largely used** to define arterial injuries suspected on CT or to localize and control arterial bleeding. **Renal embolization** has proved useful in the **primary setting** with persistent bleeding in a hemodynamically stable patient.
- **Take the control or explore proximal renal vessels before opening Gerota's fascia**, to avoid excessive intra-operative bleeding.

145. Ans. a. Observation and supportive measures

146. Ans. c. Contrast enhanced computed tomography

147. Ans. a. 20% (Ref: Smith 17/e p286)

- **Minor renal injuries** from **blunt trauma** account for 85% of cases and **do not usually require operation**^Q.
- **Bleeding stops spontaneously** with **bed rest and hydration**^Q.
- Cases in which **operation is indicated** include those associated with **persistent retroperitoneal bleeding**, **urinary extravasation**, evidence of **nonviable renal parenchyma**, and **renal pedicle injuries** (less than 5% of all renal injuries)^Q.

148. Ans. c. Contralateral renal function is ascertained

149. Ans. a. Exploration is indicated in 90% of cases

150. Ans. c. 5

151. Ans. b. Pulsatile hematoma

152. Ans. d. CECT abdomen

URETERIC INJURY

153. Ans. a. Complete renal atrophy, d. Hydronephrosis (Ref: Smith 17/e p287-288; Bailey 26/e p1286-1289, 25/e p1292-1293)

RUPTURE OF THE URETER

Ureteric injury during operation

- MC cause of injury to the ureters is **surgical trauma** during **hysterectomy** or other **pelvic surgery**^Q
- **Preoperative catheterization** of the ureters makes them easier to **protect** during surgery^Q
- **Injuries discovered** at the time of surgery should be **repaired immediately**^Q

Clinical Features: Unilateral Injuries

- **No symptoms**^Q: Secure ligation of a ureter may simply lead to silent atrophy of the kidney.
- **Loin pain** and **fever**^Q: Possibly with **pyonephrosis**, occur with infection of the obstructed system. **Urography** shows **no function**, which will be permanent unless steps are taken quickly to **relieve the obstruction** by inserting a **percutaneous nephrostomy**.
- A **urinary fistula**^Q develops through the **abdominal** or **vaginal wound**. **Nephrostomies**^Q may be inserted and **repair postponed** until edema and inflammation have subsided.

Diagnosis

- The diagnosis is rarely made until there is swelling in the loin or iliac fossa associated with a reduction of urine output.
- **Excretion urogram** or **CECT**: **Extravasation of contrast** from the injured ureter^Q.

Treatment: Early repair is safe provided that the patient is fit for surgery

Injury recognized at the time of operation

- **Ureterovesical continuity** should be restored unless the patient's condition is poor^Q.
- **Deliberate ligation** of the proximal ureter and **temporary percutaneous nephrostomy** is then the best course **until the patient is well enough** for a repair^Q.

Methods for repairing a damaged ureter

- | | |
|--------------------------------|---|
| • No loss of length | • Spatulation and end-to-end anastomosis without tension ^Q |
| • Little loss of length | • Mobilise kidney
• Psoas hitch ^Q of bladder
• Boari operation ^Q |
| • Marked loss of length | • Transureteroureterostomy ^Q
• Interposition of isolated bowel loop or mobilised appendix ^Q
• Nephrectomy ^Q |

Bilateral Ureteral Injury

- Ligation of both ureters leads to **anuria**^Q.
- Ureteric catheters will not pass and urgent relief of obstruction by **nephrostomy** or **immediate surgery**^Q is essential.

Boari operation

- A **strip of bladder wall** is fashioned into a **tube** to **bridge the gap**^Q between the cut ureter and the bladder^Q.

154. Ans. b. Hysterectomy

POLYCYSTIC KIDNEY DISEASE

155. Ans. a. Autosomal recessive trait (Ref: Smith 17/e p507-510; Campbell 10/e p3170-3176; Bailey 26/e p1283-1284, 25/e p1286-1287)

ADULT POLYCYSTIC KIDNEY DISEASE (AD)

- Inheritance is **autosomal dominant**^Q with 100% gene penetrance, 50% offsprings are affected.
- Chromosome 16 and 4^Q are affected
- Usually **bilateral**^Q
- An important cause of **renal failure**, accounting for 10-15% of patients **who receive hemodialysis**.

Pathology

- Kidneys are **grossly enlarged**^Q with multiple cysts
- Cyst are distributed **uniformly**^Q throughout cortex and medulla
- Cysts contain straw colored fluid that may become hemorrhagic
- **Renal arteriolar thickening** is a prominent finding in **adults**

Presentation

- Usually occurs in 3rd or 4th decade
- MC clinical feature is **hypertension** (75% **adults** and 25% **children**)^Q due to activation of rennin angiotensin system^Q.
- **Pain** due to infection (pyelonephritis)/obstruction/sudden hemorrhage.
- **Hematuria**^Q, **nocturia** (due to impaired concentrating ability), **nephrolithiasis** (15–20%)^Q
- Progressive decline in renal function leading CRF
- **MC cause of death** is CRF^Q.

ADPKD Extra-renal manifestations

- | | |
|--|---|
| <ul style="list-style-type: none"> • Cysts: Liver (MC)^Q, spleen, pancreas and ovaries • Berry aneurysms (10–40%)^Q • Cyst in seminal vesicles (40%), Arachnoid membrane (8%) | <ul style="list-style-type: none"> • Colonic diverticulosis^Q • Mitral valve prolapse^Q |
|--|---|

Diagnosis

- **USG**: Enlarged kidney with uniformly increased medullary echogenicity

IVP in ADPKD

- | | |
|--|--|
| <ul style="list-style-type: none"> • Stretching of the calyces by the cysts (spider leg or bell like deformity)^Q | <ul style="list-style-type: none"> • Bubble appearance^Q (calyceal distortion) • Swiss cheese appearance^Q |
|--|--|

- **CT scan** is **IOC**^Q in ADPKD

Management

- Treatment is mainly aimed to control UTI, hypertension, calculi and general measures for uremia (low protein diet)
- Pain relief by percutaneous aspiration with instillation of sclerosing agent or **Rovsing's operation (deroofting of the cyst)**^Q
- Treatment of infections by septran or ciplox.
- **Dialysis** or **renal transplantation** (only definitive treatment) for renal failure^Q.

156. Ans. c. Renal cell carcinoma 157. Ans. d. Decompression of cyst leads to normal renal function
158. Ans. a. Hypertension is rare 159. Ans. b. 16 and 4
160. Ans. a. Cysts in liver, lungs, c. Berry aneurysms 161. Ans. a. Lung
162. Ans. d. Renal transplant 163. Ans. d. 50% 164. Ans. a. Lungs
165. Ans. b. Polycystic kidney 166. Ans. b. Polycystic kidney

Radiological feature	Disease
<ul style="list-style-type: none"> • Rim/crescent sign^Q • Soap bubble appearance^Q 	Hydronephrosis
<ul style="list-style-type: none"> • Spider leg appearance^Q 	Polycystic Kidney
<ul style="list-style-type: none"> • Flower vase appearance of ureter^Q 	Horse shoe Kidney
<ul style="list-style-type: none"> • Golf hole ureter^Q 	TB bladder
<ul style="list-style-type: none"> • Drooping lily sign^Q 	Ectopic ureter
<ul style="list-style-type: none"> • Cobra head or Adder head appearance^Q • Spring onion appearance^Q 	Ureterocele
<ul style="list-style-type: none"> • Egg in cup appearance^Q 	Analgesic nephropathy causing papillary necrosis
<ul style="list-style-type: none"> • Thimble bladder^Q 	Tubercular chronic cystitis
<ul style="list-style-type: none"> • Sandy patches^Q 	Schistosomiasis of bladder
<ul style="list-style-type: none"> • Chalice/Bergman sign^Q 	Ureteric dilatation distal to neoplasm
<ul style="list-style-type: none"> • Fish hook bladder^Q 	BPH
<ul style="list-style-type: none"> • B/L spider leg appearance^Q • Swiss-cheese nephrogram^Q • Sun burst nephrogram^Q 	Polycystic kidney

167. Ans. a. Inherited as autosomal recessive
 169. Ans. b. Hepatic cyst
 171. Ans. a. Autosomal dominant (Ref: Campbell 10/e p3167-3170; Bailey 26/e p1284, 25/e p1288)
168. Ans. b. Hypertension is rare
 170. Ans. b. The presentation is unilateral

INFANTILE POLYCYSTIC KIDNEY DISEASE (AR)

- Rare, **autosomal recessive**^Q, usually bilateral
- Always become apparent during childhood, rarely upto 20 years, **most severe forms** are seen **earliest in life**^Q.
- If diagnosed at **birth**, **child dies in 2 months** due to **uremia** and **pulmonary hypoplasia**^Q
- Associated with **hepatic fibrosis**, leading to portal hypertension and hepatic failure; **pulmonary fibrosis**^Q

Diagnosis

- **IVP**: Delayed function with characteristic radial or medullary streaking (**sunburst pattern**)^Q

Treatment

- No cure, only **palliative support**^Q (respiratory care, surgery for esophageal varices, hemodialysis and renal transplantation)

PUJ OBSTRUCTION

172. Ans. d. Aberrant vessel is the most common cause (Ref: Smith 17/e p565-568; Campbell 10/e p3214-3222; Bailey 26/e p1290-1292, 25/e p1293-1295)

PELVIURETERIC (PUJ) OBSTRUCTION

- A blockage of the ureter at the junction with the renal pelvis resulting in restriction of urine flow
- **MC cause** of **fetal hydronephrosis**^Q
- More common in **boys**^Q, mainly **left sided**, **bilateral** in 10–15% cases

Causes of PUJ Obstruction	
Congenital	Acquired
<ul style="list-style-type: none"> • Aperistaltic segment^Q due to disorganization of smooth muscle or collagen deposition • Crossing aberrant renal vessel^Q 	<ul style="list-style-type: none"> • Calculus^Q • Instrumentation^Q • Infection^Q

Associated abnormalities

- PUJ Obstruction of **opposite kidney (MC)**^Q in 40%
- **VUR**^Q
- **VATER defects**^Q (Vertebral anomalies, anorectal malformations, TE fistula, Radial and renal dysplasia)

Clinical Presentation

- Most infants are **asymptomatic**^Q
- Most infants are discovered by **palpable abdominal mass** or **prenatal USG**^Q.

Diagnosis

- **USG**: Diagnoses **hydronephrosis**, but does not diagnose whether it is obstructive.
- **IVP**: It was the primary radiological study to define PUJO but now **replaced by DTPA scan**^Q.

DTPA scan

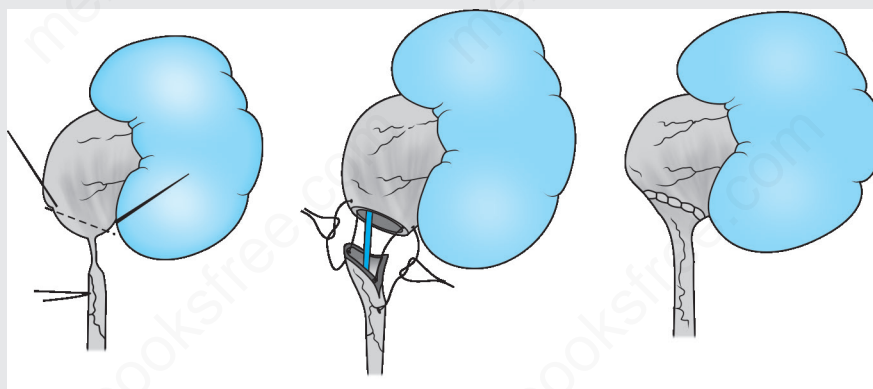
- **Investigation of choice for PUJO** to establish that hydronephrosis is due to obstruction.

- **Pressure flow studies (Whitaker test)**^Q
 - **Invasive test**, used only in cases of **equivocal result** of renal scan^Q.
 - Measures **differential pressure between kidney and bladder**
 - A percutaneous puncture of kidney is made; **contrast fluid** is infused at a constant rate with monitoring of intra-pelvic pressure. **An abnormal rise** confirms obstruction.
- **Retrograde Pyelogram**: Anatomic delineation more clear. Show the **distal end of obstruction**^Q.

Treatment

- **Conservative** in children with **good renal function without any complication**
- Pyeloplasty or nephrectomy

Types of Pyeloplasty	
Open	Endoscopic
A. Anderson Hynes (Dismembered) pyeloplasty: <ul style="list-style-type: none">• Gold standard for PUJ obstruction^Q• For large redundant pelvis with high insertion of ureter^Q.• Advantages: Broad applicability, including preservation of anomalous vessels^Q and excision of the pathological UPJ and appropriate repositioning^Q successful reduction pyeloplasty	<ul style="list-style-type: none">• For small pelvis^Q with PUJ dependent for good funnel drainage and intrarenal pelvis^Q.• More than 2 cm long area of stricture is a contraindication^Q.• Endoscopic procedures are:<ul style="list-style-type: none">a. Endopyelotomy (percutaneous or retrograde) advised for associated renal stoneb. Balloon dilatations or Lasers
B. Foleys V-Y pyeloplasty: Best applied for high insertion of the ureter	
C. Flaps (Spiral and vertical)	
Indications for nephrectomy in PUJO	
<ul style="list-style-type: none">• Permanent severe loss of renal function (< 10% function)^Q• Unmanageable complication in hydronephrotic kidney (Severe recalcitrant infection, Intractable pain, Hypertension)^Q	



173. Ans. c. Right sided lesions predominate

175. Ans. c. Dismembered pyeloplasty

177. Ans. b. Endoscopic pyelotomy is contraindicated

174. Ans. c. Painless abdominal mass

176. Ans. b. DTPA scan

178. Ans. a. Dietl's crisis

CONGENITAL ANOMALIES OF KIDNEY

179. Ans. a. Bilateral renal agenesis (Ref: Smith 17/e p506; Campbell 10/e p3128-3134; Bailey 26/e p1282, 25/e p1285)

RENAL AGENESIS

- Incidence of **unilateral**^Q renal agenesis is **1 in 1000**^Q, more common in **males**^Q and on **left side**^Q in unilateral renal agenesis.
- **Ureter** is **absent** on the side of the unformed kidney in 50%^Q cases, in rest blind ureter is found.

- Bilateral is incompatible with life and rare.
- Associated anomalies: **Oligohydramnios**^Q, **pulmonary hypoplasia**^Q (due to **defective proline synthesis**), **amniotic nodosum**^Q, **Potter's facies**^Q (seen in bilateral RA).
- Unilateral renal agenesis is associated with **unicornuate** or **bicornuate uterus** and **septate vagina** in females.
- **Colonic shadow** is placed **more laterally**^Q on X-ray KUB due to **unilateral renal agenesis**.

POTTER'S FACIES

- Hypertelorism, prominent inner canthal fold^Q
- Blunted nose, recessive chin, broad and low set ears, limb deformities^Q
- Seen in **bilateral renal agenesis**^Q

180. Ans. e. All are true

181. Ans. d. UTI (Ref: Smith 17/e p515; Campbell 10/e p3191-3192)

MEDULLARY SPONGE KIDNEY (AR)

- Dilatation of **distal portion** of the **collecting duct** with **numerous associated cysts** giving kidneys an **appearance of sponge**
- **Autosomal recessive** defect, **usually bilateral**^Q, affecting all of the papillae, but it may be unilateral
- **Infection** and **calculi** are occasionally seen as a result of urinary stasis in the tubules.

Associated with

- **Hemihypertrophy**^Q of the body
- **Hypercalcemia**^Q
- **Stone formation**^Q (Calcium oxalate or calcium phosphate)
- **Nephrocalcinosis**^Q (Calcium deposition in renal parenchyma)

Clinical features

- The only symptoms are those arising from **infection** and **stone formation**^Q.

Diagnosis

- Made on the basis of excretory urogram or contrast-enhanced CT scan.

IVP (Excretory urogram): IOC to diagnose medullary sponge kidney^Q

- **"Bristles on brush"**^Q appearance due to dilated ducts
- **"Bouquet of flowers"**^Q appearance due to calcification in the ectatic ducts

Treatment

- There is **no treatment** for medullary sponge kidney.
- Therapy is directed toward the complications (e.g. pyelonephritis and renal calculi).

182. Ans. a. Supernumerary renal arteries (Ref: Campbell's 10/e p26)

Vascular anomalies involving the kidney are very common being present in 25% to 40% of kidneys.

Supernumerary renal arteries with two or more renal arteries supplying each kidney are the **most common renal vascular anomaly**.

ABNORMALITIES OF RENAL VASCULATURE

- The **MC renal vascular anomaly** is the **presence of supernumerary renal arteries**^Q.
- **Variations of the main renal artery and vein** are common, present in **25% to 40%** of kidneys. The **most common variation** is the **occurrence of supernumerary renal arteries (two or more arteries to a single kidney)**^Q
- The **most common sub-group of supernumerary renal arteries** is a **duplicated renal artery (double renal artery)**^Q involving a second diminutive renal artery supplying each kidney
- Supernumerary renal veins are also common, but occur about half as commonly as supernumerary renal arteries.

183. Ans. a. Left renal vein (Ref: Smith 17/e p515)

RENAL COLLAR

- The **main renal vein** divides and sends **one limb anterior** and **another limb posterior** to **aorta** to reach the **IVC**^Q.
- Formed on the **left side**^Q and represents **persistence of the embryonic state**.

184. Ans. d. Is a normal variant (Ref: www.ajronline.org/content/188/5/1380.full)

PERSISTENT FETAL LOBULATION

- **Persistent fetal lobulation** is a **normal variant** seen occasionally in **adult kidneys**.
- It occurs when there is **incomplete fusion** of the **developing renal lobules**^Q.
- Embryologically, the kidneys originate as distinct lobules that fuse as they develop and grow.
- It is often seen on **ultrasound, CT or MRI** as **smooth indentations of the renal outline in between renal pyramids**^Q.
- They should be **distinguished from renal cortical scarring**, which generally overlie the pyramids^Q.

185. Ans. d. 1:1000 (Ref: Campbell 10/e p3136)

ECTOPIC KIDNEY

- The **actual incidence** among **autopsy series** varies from **1 in 500** to **1 in 1200** but the **average occurrence** is about **1 in 900**^Q.

186. Ans. c. Retrocaval Ureter (Ref: Smith 17/e p563; Campbell 10/e p1147-1149; Bailey 26/e p1286, 25/e p1290)

RETROCAVAL URETER (CIRCUMCAVAL URETER)

- An **embryologically normal ureter** becomes **entrapped behind IVC**^Q
- Because of **abnormal persistence of the right subcardinal** (as opposed to the supracardinal) **vein**. This forces the right ureter to encircle the vena cava from behind (**Altered development of IVC**)^Q
- The **right ureter** typically **deviates medially behind the IVC**^Q, winding about and crossing in front of it from medial to lateral direction, to resume a normal course to the bladder.
- More common in **males**^Q

Clinical Features

- Signs and Symptoms of **ureteric obstruction**^Q

Diagnosis

- MRI is IOC to delineate **anatomy** clearly and **non-invasively**^Q
- IVP: "Reverse J", "Fish Hook" or "Shepherd crook"^Q deformity.
- Retrograde ureterography

Surgical Management

- Ureteral division with **relocation ureteroureterostomy** in cases of obstruction.

187. Ans. d. Usually divided to gain access to renal pelvis (Ref: Smith 17/e p515; Bailey 26/e p1285, 25/e p1288)

ABERRANT RENAL ARTERY

- Arteries that originate from vessels other than aorta or the main renal artery
- **Unilateral**^Q, more common on **left side**^Q, involving **lower pole**^Q of kidney
- May cause **hydronephrosis** due to **extrinsic compression**^Q
- These are **end arteries**^Q, therefore any injury or division may lead to lower pole infarction.

- The **renal arteries** are **end-arteries**, **division** leads to **infarction** of parenchyma^Q.
- **Renal veins** have **extensive collaterals** and an aberrant vein **can be divided** with impunity^Q.

188. Ans. a. Bilateral

189. Ans. c. 1:1400 individuals (Ref: Campbell 10/e p3128)

- Most autopsy series suggest that **unilateral renal agenesis** occurs **once in 1100 births**^Q.
- In an historical survey of excretory urograms, the incidence ranged between **1 in 1500**^Q.

190. Ans. d. Biopsy (Ref: Campbell 10/e p3176-3177)

MEDULLARY CYSTIC DISEASE

- **Excretory urography** and **ultrasonography** frequently **fail to detect cysts** because they are **small**^Q.
- Cysts may be seen on **imaging studies** if they are large enough, but, **early in the disease**, cysts are **rarely visible**^Q.
- It is **best diagnosed by biopsy**^Q.
- Histologically, there is a **characteristic triad**:
 - **Irregular thickening and disintegration of the tubular basement membrane**
 - **Marked tubular atrophy with cyst development**
 - **Interstitial cell infiltration with fibrosis**

HORSESHOE KIDNEY

191. Ans. a. Spider like appearance in IVP, d. Heminephrectomy improves function (Ref: Smith 17/e p512-515; Campbell 10/e p3145-3149; Bailey 26/e p1282-1283, 25/e p1286)

HORSESHOE KIDNEY

- **MC renal fusion abnormality**^Q with incidence of **1:400**^Q, more common in **males**^Q
- Fusion at the **lower poles**^Q by a parenchymatous or fibrous isthmus

Etiopathogenesis

- Fusion occurs before kidneys have rotated at their long axes
- The axes of these masses are **vertical**^Q whereas axes of normal kidneys are oblique to spine, because they lie along the edges of the psoas muscle
- **Pelvis and ureters** are usually **anteriorly placed**^Q or anteromedial, crossing anteriorly to isthmus
- **Calyces** point **posteriorly**^Q. Lowermost calyx extends caudally or even medially
- **Migration is incomplete**. Inferior mesenteric artery (IMA) **prevents full ascent**^Q
- **Isthmus** usually located adjacent to **L3-L4** vertebra, just below the origin of IMA from aorta
- **Ureteral compression** can occur due to **anteriorly displaced ureter**^Q or from obstruction by **aberrant vessels** leading to hydronephrosis and infection.

Associated Abnormalities (Present in one third^Q cases)

- | | |
|--|--|
| <ul style="list-style-type: none"> • CVS (VSD) and CNS involvement • Anorectal malformations^Q • Unicornuate or bicornuate uterus^Q | <ul style="list-style-type: none"> • Renal: VUR and PUJ obstruction in one third^Q cases • Hypospadias, undescended testis^Q |
|--|--|

Clinical Features

- Most are **asymptomatic**^Q, mostly it is an autopsy finding
- **MC symptom**: vague abdominal pain^Q
- **Rovsing sign**: abdominal pain, nausea and vomiting^Q on hyperextension of spine

Diagnosis is usually made on IVP showing

- | |
|--|
| <ul style="list-style-type: none"> • Low lying kidneys^Q, closed to vertebral column • Vertical axes^Q through kidneys point towards the LS spine • Characteristic orientation of the calyces, directed posterior to each renal pelvis, with the lowermost calyx pointing caudally or even medially (Hand joining sign)^Q • High insertion of the ureter appears to drape over a midline mass (Flower vase like curves of ureters)^Q |
|--|

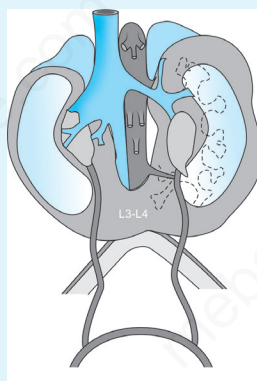
- **Angiography** is done before surgery as **blood supply is unpredictable**^Q but not needed usually as helical CT is useful.

Complications

- Prone to **ureteral obstruction** due to high incidence of **aberrant renal vessels**^Q and the necessity for ureters to arch over the renal tissues
- **Hydronephrosis, stone, infection**^Q
- Large fused kidney occupying the concavity of sacrum may cause **dystocia**^Q

Treatment

- **Pyeloplasty** is done only in symptomatic cases, **isthmus is not divided**^Q.

**AORTIC ANEURYSM WITH HORSESHOE KIDNEY**

- **Preoperative angiography** is **essential**^Q for the proper evaluation of the renal arteries, as there are multiple aberrant renal arteries arising from aorta
- Isthmus rarely needs to be divided
- **Left retroperitoneal approach**^Q is preferred.

192. Ans. b. L3-L4 vertebra 193. Ans. b. Horseshoe kidney
194. Ans. d. Isthmus may contain aberrant vessels

RENAL CYST

195. Ans. a. Renal cyst (Ref: Smith 17/e p510-512; Campbell 10/e p3188-3189, 9/e p1575; Bailey 26/e p1284, 25/e p1288)

BENIGN RENAL CYST

- MC benign renal lesions^Q, represent > 70% of all asymptomatic^Q renal masses.
- More common in **men**, and can be **solitary** or **multiple**^Q
- Prevalence **increases with age**, can be found in > 50% of patients > 50 years^Q
- **Treatment**: Percutaneous **drainage and sclerosis**^Q with 95% alcohol.

Bosniak's Classification of Simple and Complex Cyst	
Category I	Simple benign cyst ^Q with good through-transmission, no echoes within the cyst, sharply, margined smooth wall; requires no surgery
Category II	Looks benign with septation, minimal calcification, and high density ; requires no surgery ^Q
Category II F	Calcification in wall thicker and more nodular ^Q than in category II, septa have minimal enhancement ; requires no surgery
Category III	Complicated lesion cannot confidently be distinguished from malignancy, more calcification , more prominent septation ; more likely to be benign than malignant; requires surgical exploration ^Q and/or removal
Category IV	Malignant lesion ^Q with large cystic components, irregular margins ; solid vascular elements ; requires surgical removal ^Q

196. Ans. a. Polycystic kidney (Ref: Smith 17/e p510-512; Campbell 10/e p3188-3189, 9/e p1575)

- Incidence of polycystic kidney: 1 in 400^Q (0.25%)
- Simple renal cyst is MC cystic disease in human kidney (incidence is 0.22% from birth to 18 years)^Q

URETEROCELE

197. Ans. d. Ureterocele (Ref: Smith 17/e p560-561; Campbell 10/e p3240-3259; Bailey 26/e p1286, 25/e p1290)

URETEROCELE

- Cystic dilation of the terminal ureter
- More common in **females**^Q

Types

- **Intravesical** (20%): Most often with **single ureter**^Q
- **Ectopic** (80%): Nearly always involve the **upper pole of duplicated ureters**^Q.

Clinical Features

- MC presentation is UTI or urosepsis^Q
- Palpable abdominal mass (due to **hydronephrosis**)
- **Prolapse** through female urethra as a cyst
- **Calculi** due to urinary stasis, mostly in distal ureter

Diagnosis

- **USG**: Hydroureteronephrosis, cyst in bladder
- **IVP**: Typical **Adder head** or **Cobra head** or **Spring onion appearance**^Q is diagnostic of ureterocele
- **MCU**: A **smooth filling defect**^Q in the trigonal area
- **Cystoscopy**: **Enlarging and collapsing cysts**^Q as urine flows

Treatment

- Significant upper pole function: **Endoscopic incision** or **cyst excision and reimplantation**^Q
- Poor upper pole function: Upper pole nephrectomy and partial ureterectomy.

198. Ans. d. Endoscopic diathermy
199. Ans. b. Ureterocele
200. Ans. c. Ureterocele

URETERIC ABNORMALITIES

201. Ans. a. Bulbar urethra (Ref: Smith 17/e p559; Campbell 10/e p3385-3387, 3407-3408; Bailey 26/e p1285-1286, 25/e p1288-1290)

DUPLICATION OF URETER (AD)

- MC congenital anomaly of upper urinary tract^Q
- Mode of inheritance is autosomal dominant^Q
- More common in females and often bilateral^Q
- “Yo-Yo” effect^Q in fused ureter (incomplete duplication) is seen.

Types

- **Incomplete duplication:** Both ureters join together and a single ureteric opening
- **Complete duplication:** Both ureters open separately
 - **Weigert-Meyer’s rule^Q:** In cases of complete duplication, the upper pole ureter and the lower pole ureter rotate on their long axes so that the **upper pole ureteric orifice is medial and caudal to the lower pole orifice^Q.**
 - The **upper pole ureter** becomes **ectopic and obstructed^Q**, whereas the **lower pole ureter** end laterally and have a **short intravesical tunnel** leading to **VUR^Q.**

Clinical Features

- Many patients are **asymptomatic^Q**
- A common presentation is **persistent or recurrent infections^Q.**

- In females, the **upper pole ureter** may be **ectopic**, with an **opening distal to the external sphincter^Q** or even **outside the urinary tract.**
- Such patients have **classic symptoms: incontinence** characterized by **constant dribbling** with a **normal pattern of voiding^Q.**

- In males, because the mesonephric duct becomes the vas and seminal vesicles, the **ectopic ureter** is **always proximal to the external sphincter^Q**, and associated **incontinence does not occur^Q.**

Diagnosis

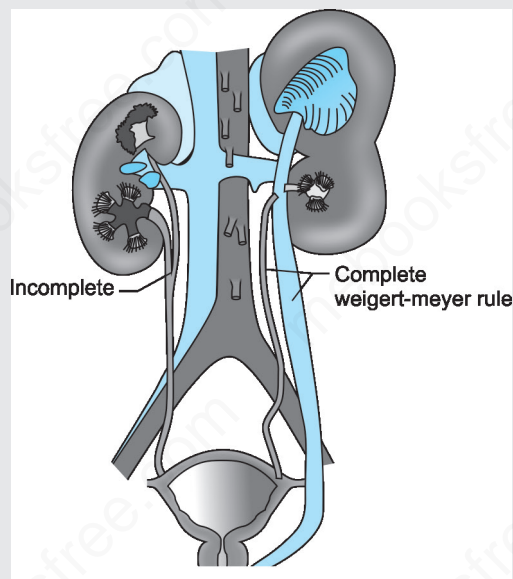
- **IVP:** Shows **duplication** in most of cases
- **MCU** discloses **VUR** (in lower pole ureter) and demonstrate presence of **ureterocele** (in upper pole ureter).

Treatment

- Treatment of reflux alone is not influenced by duplication in most of the cases.
- Lower grade reflux is treated medically and higher grade surgically
- **Surgery** is reserved for **upper pole obstruction or ectopy^Q.** If renal function in one segment is very poor, **heminephrectomy** is the most appropriate treatment.

202. Ans. a. Duplication of renal pelvis

- MC congenital anomaly of upper urinary tract: Duplication of ureter^Q
- MC congenital anomaly of genitourinary tract: VUR^Q



203. Ans. a. Prostatic urethra (Ref: Smith 17/e p562-563; Campbell 10/e p3385-3387, 3407-3408; Bailey 26/e p1285-1286, 25/e p1288-1290)

ECTOPIC URETERAL ORIFICE

- Around 80% is associated with a **duplication collecting system**^Q.
- More common in **females**^Q

Location

- **Males:** Prostatic^Q or posterior urethra (MC)^Q, lateral in bladder
- **Females:** Anterior urethra (MC)^Q, vestibule, vagina

Clinical features

- **Females:** Continuous incontinence with an otherwise normal voiding^Q, persistent vaginal discharge (Ureter opening in vagina)^Q
- **Males:** MC presentation is UTI, no urinary incontinence^Q, recurrent epididymo-orchitis (Epididymitis in a prepubertal boy, ectopic ureter should be ruled out).

Complications

- Ectopic ureter may be severely obstructed, causing massive hydronephrosis

Diagnosis

- **IVP:** Drooping lily sign^Q (Non visualized upper pole of a duplex system displaces the lower pole down, looking like a drooped down lily flower on IVP)

Treatment

- Mainly expectant, if there are no symptoms.
- Ureteric reimplantation or upper pole nephrectomy^Q depending on moiety function.

204. Ans. d. Paradoxical incontinence

205. Ans. c. Lower pole moiety is more prone to obstruction and upper pole more prone to reflux

206. Ans. d. Ureteral duplications

207. Ans. c. Below and medial to the lower pole ureter

208. Ans. a. Posterior urethra

209. Ans. a. Vestibule

210. Ans. a. In males, there is duplication in 80% cases

- Ectopic ureteral orifice is associated with a duplication collecting system^Q in 80%, in females^Q, not in males.

211. Ans. c. Ureteral incontinence with otherwise normal voiding

212. Ans. a. Recurrent UTI

VESICoureTERIC REFLUX

213. Ans. a. Micturating cystourethrogram (Ref: Smith 17/e p179-191; Campbell 10/e p3267-3293)

VESICoureTERIC REFLUX (VUR)

- VUR is the **most common inheritable disease**^Q of the genitourinary tract.
- **Autosomal dominant** mode of transmission.
- Overall incidence is >10%^Q and in children with UTI is 30%
- **Majority** of cases (75%) are **asymptomatic**^Q.
- Major cause of VUR is **attenuation of trigone**^Q and its contiguous **intravesical ureteric musculature**^Q.

Types

Primary	Secondary
<ul style="list-style-type: none"> • The length of submucosal ureter may be short • Deficiency of the longitudinal muscle^Q of the intravesical ureter resulting in an inadequate valvular mechanism 	<ul style="list-style-type: none"> • Caused by elevated pressures in the bladder • MC anatomical cause: Posterior urethral valves (50% have VUR)^Q • Other causes: Neurogenic bladder or bladder dysfunction

Investigations

- MCU is IOC for VUR^Q
- DMSA scan: IOC for pyelonephritis and cortical renal scarring^Q
- Urine culture

MCU Grading of VUR (International classification)	
Grade I	Reflux into non dilated ureter ^Q
Grade II	Reflux into pelvis and calyces ^Q without dilation
Grade III	Mild to moderate dilation of the ureter, renal pelvis and calyces ^Q with minimal blunting of the fornices
Grade IV	Dilation of the pelvis and calyces with blunting ^Q .
Grade V	Gross dilation of the ureter, pelvis and calyces ; loss of papillary impression and ureteral tortuosity ^Q .

Natural History

- With bladder growth and maturation, most low-grade reflux resolves spontaneously^Q.
- Severe grades of reflux are less likely to resolve^Q.
- Mean age of reflux resolution is 6-7 years^Q.

• Resolution rates: Grade I and II: 80-84%, Grade III: 50%, Grade IV: 20-30%, Grade V: 0-5%^Q

- Younger children, especially the neonates, are more likely to have spontaneous resolution^Q
- Reflux of infected urine cause pyelonephritis. Repeated such episodes lead to renal scarring and nephropathy resulting in hypertension and azotemia^Q.
- If urine is kept sterile, significant nephropathy rarely occurs.

Management

- **Medical management:** Keep the urine sterile^Q and wait for spontaneous resolution

Medical management recommended as the initial management for

- All prepubertal children with grade I-III reflux^Q as most of the cases usually resolve.
- Unilateral grade IV reflux, especially in young children^Q.

Drugs used in VUR

- Age up to 6 weeks: Amoxicillin or Ampicillin^Q.
- Age after 6 weeks: The biliary system is mature enough to handle TMP-SMX (DOC for prophylaxis)^Q. Usually nighttime doses are given. Other option is nitrofurantoin.
- If organism are resistant to a single agent, two drugs can be given alternately in morning and evening.

- Periodic cultures every 3 months^Q for evaluation of breakthrough infections.
- DMSA scan if recurrent bouts of pyelonephritis^Q are suspected. Yearly radiographic studies for resolution.
- **Surgical management:** Uterovesicoplasty or ureteric reimplantation^Q and STING^Q (Subureteric transurethral injection of teflon paste) are the treatment options.

Methods of Ureteric Implantation

- Lich-Gregoir technique^Q by direct implantation of ureter
- Leadbetter-Politano technique^Q involves creation of a submucosal anti-reflux tunnel.

Indications of Surgical management in VUR

- Breakthrough UTIs^Q despite prophylactic antibiotics
- Severe grades of reflux- grade V or bilateral grade IV^Q
- New renal scars or deterioration of renal function^Q as on serial USG of DMSA scan.
- Reflux that persist in girls at full linear growth (at puberty)^Q
- Reflux associated with congenital abnormalities (Bladder diverticula)^Q.
- All secondary reflux, which persist^Q after correction of the primary cause e.g. fulguration of posterior urethral valves or management of uninhibited detrusor.

214. Ans. b. Micturating cystourethrography

215. Ans. b. II

216. Ans. a. I

217. Ans. c. Both

218. Ans. a. Cotrimoxazole

219. Ans. b. Postnatal scarring may occur even in the absence of urinary tract infections

- Although UTI is the most important cause for scarring and nephropathy in patients with VUR, scarring can occur even in the absence of UTI due to pressure effect of reflux^Q on the renal tissue.

220. Ans. c. VUR induced pyelonephritis

RENAL ARTERY ANEURYSM

221. Ans. b. 5% (Ref: Smith 17/e p515-516; Campbell 10/e p1078-1080; Bailey 26/e p1288, 25/e p1292)

RENAL ARTERY ANEURYSMS

- Most are saccular^Q, and 75% occur at the bifurcation of the primary or secondary branches^Q.

- **Medial fibroplasia^Q** is the MC cause of **true renal aneurysms**, followed by degenerative atherosclerosis and polyarteritis nodosa. **Spontaneous or traumatic dissection** is the MC cause of **false renal aneurysms^Q**.

Clinical Features

- Usually **asymptomatic^Q** or have associated renal artery occlusive disease and renovascular hypertension or ischemic nephropathy.
- **Rupture** occurs in **< 3%^Q of cases**, but when the aneurysm ruptures in a **pregnant woman**, the **fetal mortality rate is 75%**, and the **maternal mortality rate is 50%^Q**.

Diagnosis

- Around 50% are **diagnosed incidentally^Q**, when renal arteriogram is performed for another reason or during workup for hypertension.
- Plain film of abdomen may show intra-renal or extra-renal **ring like calcification^Q**.

Treatment

- Surgical repair

Indications of Surgery	
<ul style="list-style-type: none"> • Any aneurysm >2 cm^Q • Woman of childbearing age^Q 	<ul style="list-style-type: none"> • Enlarging^Q on serial X-rays • Poorly calcified or poor access to healthcare^Q

- Patients who are followed for renal artery aneurysms at regular intervals should have thorough medical control of their blood pressure.

HEPATORENAL SYNDROME

222. Ans. a. Urine sodium **< 10 mEq/L**, b. Normal renal histology (Ref: Sabiston 19/e p585; Blumgart 5/e p389; Shackelford 7/e p1449, 1527; Harrison 18/e p2601; wikipedia.org)

HEPATORENAL SYNDROME

- HRS is a state of **functional renal failure** (reduced GFR) **without renal pathology** in patients with **severe liver disease^Q**.
- **Low cardiac output** and **high plasma rennin** predicts development of HRS^Q
- Occurs in about 10% of patients with **advanced cirrhosis** or **acute liver failure^Q**.

Pathophysiology of HRS
<ul style="list-style-type: none"> • Marked disturbances in the arterial renal circulation: Increase in renal vascular resistance accompanied by a reduction in systemic vascular resistance^Q. • The reason for renal vasoconstriction is most likely multifactorial and is poorly understood. • Structurally or histologically kidneys are normal and recover function after successful liver transplantation^Q. • Pathogenic hallmark of HRS is intense renal vasoconstriction with co-existent vasodilatation^Q.

- In HRS, **urine sodium** is typically **< 10 mEq/L** with **hyperosmolar urine**, **oliguria** (**< 400 mL/24 hr**), fractional excretion of sodium **< 1**; and urine creatinine-to-plasma creatinine ratio **> 30:1**.

Type 1 HRS	Type 2 HRS
<ul style="list-style-type: none"> • Characterized by a progressive impairment^Q in renal function and a significant reduction in creatinine clearance within 1–2 weeks of presentation^Q. • Poor outcome^Q 	<ul style="list-style-type: none"> • Characterized by a reduction in glomerular filtration rate^Q with an elevation of serum creatinine level, but it is fairly stable^Q • Associated with a better outcome

Clinical Features

- HRS is often seen in patients with refractory ascites and requires exclusion of other causes of acute renal failure.

Diagnosis

- The diagnosis is made usually in the presence of a **large amount of ascites** in patients who have a **stepwise progressive increase in creatinine^Q**.

International Ascitic Club Criteria for HRS	
<ul style="list-style-type: none"> • Serum creatinine > 1.5 mg/dL^Q • Absence of shock, bacterial infection, nephrotoxic drugs, diarrhea or renal fluid losses^Q • Absence of significant proteinuria (< 500 mg/day^Q) • No evidence of obstructive uropathy^Q 	<ul style="list-style-type: none"> • Low urine volume (< 500 ml/day) and low urine sodium (< 10 mEq/L^Q) • No sustained improvement in renal function after diuretic withdrawal and expansion of plasma volume with 1.5 L of isotonic saline^Q

Treatment

- Drug of choice is **terlipressin^Q** (albumin improves the therapeutic response)
- Midodrine + octreotide + IV albumin may **reverse renal failure^Q** in some patients with HRS.
- Best therapy for HRS: Liver transplantation (recovery of renal function is **typical** in this setting)^Q
- In patients with either **type 1** or **type 2** HRS, the **prognosis is poor** unless transplant can be achieved within a short period of time.

223. Ans. c. Urine osmolality lower than plasma osmolality

- Hepatorenal syndrome is associated with **urine osmolality greater than plasma osmolality^Q**.

224. Ans. a. The creatinine clearance is > 40 ml/min, c. The urine osmolality is lower than the plasma osmolality

DIALYSIS

225. Ans. b. Peritonitis, c. Hypertension (Ref: Harrison 18/e p2324-2325)

COMPLICATIONS DURING HEMODIALYSIS

- Hypotension is the **MC acute complication** of hemodialysis, particularly among patients with diabetes mellitus.
- Muscle cramps during dialysis are also a common complication of the procedure.
- Anaphylactoid reactions to the dialyzer, particularly on its first use, have been reported most frequently with the **bioincompatible** cellulose-containing membranes.
- Cardiovascular disease constitutes the **major cause of death** in patients with ESRD. Cardiovascular mortality and event rates are **higher** in dialysis patients than in patients post-transplantation, although rates are extraordinarily high in both populations.

RENAL TRANSPLANT

226. Ans. a. Hardy (Ref: Campbell 10/e p1228)

First autologous renal transplantation was performed by 'Hardy' in 1963^Q

'In 1963, Hardy performed the first renal autotransplantation to resolve on extensive ureteral lesion'.

227. Ans. c. In India, organ harvesting from brain dead patients is not permitted by law (Ref: Bailey 25/e p1417-1421)

RENAL TRANSPLANTATION

- Most of the organs used for transplantation are **obtained from brainstem-dead, heart-beating deceased donors^Q** and in the majority of cases multiple organs are procured.
- In India, for **organ harvesting from brain dead patients^Q**, the relatives are formally asked to sign a prescribed form, in contrast to U.K., where the transplant co-ordinators and nurse just write and sign in the file about the consent given.
- After removal from the donor, the kidney is **flushed with chilled organ preservation solution** and, if necessary, stored briefly on ice^Q until transplanted into the recipient.
- Calcineurin blockers are especially useful in renal transplant patients. These include **cyclosporine** and **tacrolimus^Q**.

228. Ans. c. Skin cancer (Ref: Bailey 26/e p1416-1417, 25/e p1416)

MALIGNANCY AFTER TRANSPLANTATION

- After transplantation there is an increased risk of developing most types of malignancy but the **risk is particularly high** for those types of **tumour in which viral infection plays an etiological role**.
- The risk is particularly high for **skin cancer^Q** and a condition called post-transplant lymphoproliferative disorder (PTLD)^Q.
- The risk of **skin cancer after transplantation rises with age** and with exposure to sunlight, and it has been predicted that **50% of transplant patients will develop a skin malignancy within 20 years of transplantation^Q**.

PTLD

- PTLD is an **abnormal proliferation of B lymphocytes**, usually in response to **Epstein-Barr virus infection^Q**.
- PTLD occurs in around **1-3% of kidney and liver transplant recipients** and the incidence is considerably **higher in children**.
- Patients at **most risk** are those who have **received aggressive immunosuppression**. PTLD is a serious condition with a **mortality rate of up to 50%**.
- If it is identified at an early stage, **reduction or cessation of immunosuppressive therapy^Q** may cause disease regression and result in a cure.
- **Chemotherapy** is often given and antiviral therapy, **surgery and radiotherapy** may also have a role in treating established disease.

- Transplant patients also have a 300-fold increased risk of developing Kaposi's sarcoma^Q, although this malignancy is still very uncommon after transplantation.

229. Ans. a. Right kidney is preferred over the left for transplantation (Ref: Bailey 26/e p1420, 25/e p1420)

If the left kidney has a single renal artery (10% of kidneys have two or more renal arteries) it is usually chosen for transplantation because it has a longer renal vein, which simplifies the transplant operation^Q.

RENAL TRANSPLANTATION

- Before the donation it is essential to perform imaging (usually MR angiography or CT angiography) to delineate the anatomy of the arterial supply to the kidneys^Q.
- If the left kidney has a single renal artery (10% of kidneys have two or more renal arteries) it is usually chosen for transplantation because it has a longer renal vein, which simplifies the transplant operation^Q.
- The presence of multiple arteries does not necessarily preclude donation although implantation of living donor kidneys with multiple arteries may increase the chances of vascular complications developing after implantation^Q.

230. Ans. b. Corticosteroids, d. Cyclosporine (Ref: Bailey 26/e p1415, 25/e p1415)

IMMUNOSUPPRESSIVE DRUG REGIMEN IN RENAL TRANSPLANTATION

- Combination of glucocorticoid with cyclosporine or tacrolimus, azathioprine or mycophenolate mofetil and sometimes antilymphocyte antibody preparation^Q.

KIDNEY AND URETER: ANATOMY AND PHYSIOLOGY

- Kidney receives 20% of cardiac output
- Renal vein is anterior, renal artery in middle, renal pelvis is posterior (VAP)
- Main renal artery divides into 4–5 segmental arteries. First & most consistent division is posterior branch.
- There are 2 or more LNs at the renal.
- Hilum (first site of metastasis).
- From the left kidney, lymphatic trunk then drain into para-aortic nodes.
- From the right kidney, lymphatics drain into hilar lymph node, inter-aortocaval & paracaval nodes.

231. Ans. d. Urethral valves (Ref: Campbell's 10/e p3394)

URINARY ASCITES

- Forty percent of neonatal ascites is caused by urinary conditions^Q.
- Urinary ascites occurs when high intraluminal pressure forces urine to extravasate from the kidney^Q, usually across a renal fornix.
- Urine then enters the retroperitoneum and travels across the peritoneum as a transudate.
- If aspirated from the peritoneal cavity, the ascites or extravasated urine contains electrolyte and creatinine levels similar to serum^Q.
- The urine within the peritoneum is subject to the large absorptive mesothelial surface that quickly normalizes these values, masking the identity of ascitic fluid as urine.
- The diagnosis of urinary ascites may be difficult and may require definitive upper tract drainage in the form of nephrostomy tubes in order to establish the etiology of the ascites and allow its resolution.
- Urinary ascites in the case of distal obstruction may serve to lower urinary pressures and offer some protection to the developing kidneys^Q.

Causes of Urinary Ascites

<ul style="list-style-type: none"> • Posterior urethral valves^Q • Urethral stricture^Q • Urethral atresia^Q • Bladder outlet obstruction^Q • Ectopic ureterocele^Q • Neurogenic bladder^Q 	<ul style="list-style-type: none"> • Hydrocolpos • Sacrococcygeal teratoma^Q • Bladder perforation^Q during delivery • Urachal lacerations secondary to umbilical artery catheterization
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232. Ans. c. Urachal fistula (Ref: Campbell's 10/e p3382–3384)

PATENT URACHUS

- A patent urachus is suspected in the neonatal period by continuous or intermittent drainage of fluid from the umbilicus^Q.
- The most common organisms cultured from the umbilical drainage include *Staphylococcus aureus*, *Escherichia coli*^Q
- Additional presentations include an enlarged or edematous umbilicus and delayed healing of the cord stump^Q

Diagnosis

- The diagnosis is confirmed by demonstration of the fluid-filled canal on longitudinal ultrasound or contrast filling on retrograde fistulogram or voiding cystourethrogram (VCUG)^Q

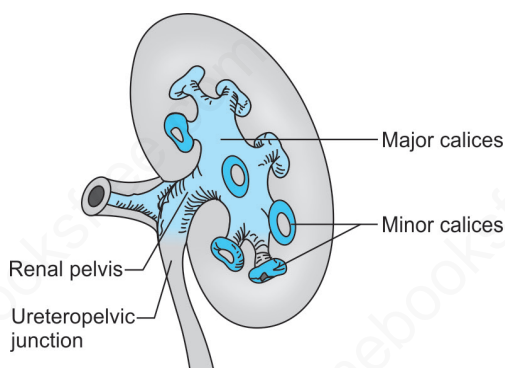
Management

- Management of an infected urachus with abscess formation includes initial drainage under antibiotic coverage^Q.
- Once the infection has subsided, complete excision of the patent urachus including a bladder cuff is required.
- Removing all anomalous tissue avoids:
 - Recurrences or stone formation^Q
 - Prevents the rare event of later transformation into a malignant adenocarcinoma^Q.

KIDNEY AND URETER ANATOMY AND PHYSIOLOGY

233. Ans. a. Peristalsis due to flow of urine (Ref: Oxford Urology 6th/2123)

- Ureters are situated retroperitoneally, and are identified by peristalsis^Q.



234. Ans. c. Genitofemoral nerve (Ref: BDC 5/e p325, 326)

- The genitofemoral nerve lies posterior to the ureter^Q. The ureter lies on the genitofemoral nerve, which is posterior.

235. Ans. d. Ischial spine (Ref: Snell's 7/e p284, 382)

At the level of ischial spine ureter changes its direction from down-backward to forward - medially but there is no constriction. The normal anatomical narrowing of ureter are the potential sites of obstruction by ureteric (kidney) stone.

NORMAL ANATOMICAL NARROWING OF URETER

- Uretero-pelvic junction^Q
- Where ureter cross the brim of pelvic inlet^Q (at site of crossing of iliac artery^Q)
- Juxtaposition of vas deferens or broad ligament
- Uretero-vesicle junction^Q
- Ureteric orifice

236. Ans. d. Ureterovesicle junction

237. Ans. b. It is a type of portal-circulation (Ref: Snell's 7/e p283)

Renal Circulation	
Artery	Vein
<ul style="list-style-type: none"> • Right renal artery is longer than left^Q. • Close to hilum, renal artery divides into 5 segmental arteries, that are end-arteries^Q • Renal artery → 5 segmental arteries → Arcuate artery → Interlobular artery → Afferent glomerular arteriole^Q 	<ul style="list-style-type: none"> • Left renal vein is longer than right^Q • Stellate veins drain most superficial zone of renal cortex^Q • Left kidney is preferred for transplantation due to longer renal vein^Q

238. Ans. b. Below uterine artery in the Mackenrodt's ligament (Ref: Keith and Moore 4/e p374, 384)

- Maximum chance of ureteric injury is in hysterectomy, while ligating uterine vessels in the Mackenrodt's ligament^Q.
- Ureter is also vulnerable to injury when ovarian vessels are being ligated during oophorectomy.

239. Ans. a. Gonadal vessels lie anterior to it (Ref: Keith and Moore 4/e p281)

- Gonadal vessels and colic vessels lie anterior to ureter; IVC is medial; gonadal vein and inferior mesenteric vein is on left side^Q.

240. Ans. b. Tongue like papillary projection

241. Ans. c. Peristaltic movements

242. Ans. d. 0–5 cm of H₂O

- Resting ureteric pressure is ~0–5 cm H₂O^Q
- Ureteric contraction pressures range from 20–80 cm H₂O^Q.

243. Ans. a. Trapezius (Ref: Smith 17/e p145–146)

NEPHRECTOMY

- Two common approaches:
 - Transperitoneal abdominal^Q approach
 - Retroperitoneal loin^Q approach
- Retroperitoneal loin approach is preferred method except in malignant tumors and renal injuries (to exclude other injuries)^Q

NEPHRECTOMY (LOIN APPROACH)

- Following muscles are cut in loin approach:
 - Lattisimus dorsi^Q
 - Serratus posterior-inferior^Q
 - External and internal oblique, transversus abdominis^Q

244. Ans. c. Renal artery stenosis

245. Ans. a. One year of age

- The neonatal kidney achieves concentrating ability equivalent to adult's kidney by one year of age^Q
- The neonatal kidney achieves adult's GFR by two years of age^Q.

MISCELLANEOUS

246. Ans. a. Urethral stone

Relation of hematuria to micturition	Site of bleeding
Blood appears at the beginning	Urethra ^Q
Blood appears at the end	Vesical ^Q
Blood is intimately mixed throughout the process	Prerenal, renal or vesical ^Q

247. Ans. c. Ureteral calculus

- Clinical picture is suggestive of ureteric colic.

248. Ans. b. Excretion of less than 500 ml in 24 hours

249. Ans. a. 7 ml

- The average capacity of the renal pelvis is 4–8 ml^Q.

250. Ans. c. Chronic renal failure (Ref: Smith 17/e p536)

- Low and fixed specific gravity of urine is seen in chronic renal failure.

251. Ans. b. Renal TB

Autosplenectomy	Sickle cell anemia ^Q
Autonephrectomy	Renal TB ^Q

252. Ans. d. Urethrovaginal fistula (Ref: Bailey 25/e p1320)

253. Ans. a. Transureterostomy

Urinary Bladder

MULTIPLE CHOICE QUESTIONS

ECTOPIA VESICAE

1. In ectopia vesicae, bone divided is: (MHSSMCET 2011)
 - a. Pubic bone
 - b. Sacrum
 - c. Coccyx
 - d. Iliac bone
2. Ectopic vesicae includes all except: (COMEDK 2005)
 - a. Hypospadias
 - b. Extrophy of bladder
 - c. Defective abdominal wall
 - d. Bifid clitoris
3. All of the following are features of extrophy of the bladder except: (All India 97)
 - a. Epispadias
 - b. Cloacal membrane is present
 - c. Posterior bladder wall protrudes through the defects
 - d. Umbilical and inguinal hernia
4. Which is not seen in complete ectopic vesicae: (TN 89)
 - a. Umbilical hernia
 - b. Visible uretero vesical efflux
 - c. Hypospadias
 - d. Waddling gate
5. About ectopia vesicae, following is true except: (PGI June 98)
 - a. CA bladder may occur
 - b. Ventral curvature of penis
 - c. Incontinence of urine
 - d. Visible ureterovesical efflux
6. For treatment of the ectopic-vesicle, which of the following bone is divided to reach the site? (UPPG 2004)
 - a. Pubic rami
 - b. Iliac bone
 - c. Ischium bone
 - d. Symphysis

URINARY BLADDER STONES

7. Regarding urinary bladder stone one is not true: (AIIMS June 98)
 - a. Common in pediatric patient in tropics than that of non tropical areas
 - b. Uric acid stones are dropped from above
 - c. Jack stone is due to urea splitting bacteria
 - d. Commonly distal passage obstruction cause stone
8. Secondary vesical calculus refers to stones formed due to: (Karnataka 2006)
 - a. Hypercalciuria
 - b. Injury
 - c. Infection
 - d. Migrating from above

9. Not true about bladder stones is: (AIIMS Nov 2001)
 - a. Rare in Indian children
 - b. Primary stones are rare
 - c. Small stones can be removed per urethra
 - d. Maximum stones are radioopaque
10. The commonest bladder stone is: (PGI 84)
 - a. Triple phosphate
 - b. Xanthine
 - c. Uric acid
 - d. Cysteine
11. The following is true about bladder stones: (PGI 84)
 - a. Girls more than boys
 - b. Treatment is litholapexy
 - c. Always forms in kidneys and passes down to bladder
 - d. Usually asymptomatic
12. Jack stone calculi is seen in which anatomic part: (MAHE 2006)
 - a. Prostate
 - b. Kidney
 - c. Ureter
 - d. Bladder
13. Which of the following is false regarding endemic bladder stones? (AIIMS Nov 2013)
 - a. Always associated with recurrence
 - b. High incidence in cereal based diet
 - c. Peak incidence in 3 years old children in India
 - d. Most common type is ammonium urate or calcium oxalate

URINARY BLADDER: MALAKOPLAKIA

14. Malakoplakia of the urinary bladder is considered to be associated with: (COMEDK 2005)
 - a. TB
 - b. Urothelial carcinoma
 - c. Schistosomiasis
 - d. Defect in phagocytosis
15. True about malakoplakia is: (MHPGMCET 2002)
 - a. Benign lesion of urinary bladder
 - b. May turn into malignancy
 - c. Michaelis-Gutmann bodies are characteristic feature
 - d. May cause severe hematuria and lead to death

URINARY BLADDER: TUBERCULOSIS

16. Cystoscopic findings in TB bladder are all except: (PGI Dec 97)
 - a. Cobblestone mucosa
 - b. Thimble bladder
 - c. Golf hole ureter
 - d. Whitish efflux from the ureteric holes

17. Thimble bladder is seen in: (Recent Question 2015, All India 91)
- Acute tuberculosis
 - Chronic tuberculosis
 - Neurogenic bladder
 - Schistosomiasis
18. Treatment of 'Thimble bladder' is: (JIPMER 81, DPG 84)
- Anti-tubercular treatment
 - Corticosteroids
 - Ileocystoplasty
 - Anti-tubercular drugs + steroids

SCHISTOSOMIASIS

19. A patient, Ramu presents with hematuria for many days. On investigations he is found to have renal calculi, calcifications in the wall of urinary bladder and small contracted bladder; most probable cause is: (AIIMS Nov 2001)
- Schistosomiasis
 - Amyloidosis
 - Tuberculosis
 - CA urinary bladder
20. One of the following disease will show urinary bladder calcification radiologically which resemble fetal head in pelvis: (AIIMS June 2000)
- Tuberculosis
 - Schistosomiasis
 - Chronic cystitis
 - Malignancy
21. Metrifonate is effective against: (COMEDK 2008)
- Amebiasis
 - Leishmaniasis
 - Schistosomiasis
 - Giardiasis

CARCINOMA URINARY BLADDER: RISK FACTORS

22. Carcinoma common in dye industry workers: (MHPPGM CET 2001)
- Skin
 - Scrotum
 - Urinary bladder
 - Maxilla
23. Transitional cell carcinoma can be seen in: (MHSSMCET 2006)
- Analgesic nephropathy
 - Urate nephropathy
 - Pulmonary infections
 - Myocardial infarction
24. Transitional cell carcinoma of bladder is associated with: (PGI June 2001)
- Schistosomiasis
 - Naphthylamine
 - Smoking
 - Tuberculosis of bladder
25. Squamous cell tumor of urinary bladder is due to: (PGI June 97)
- Stone
 - Schistosomiasis
 - Chronic cystitis
 - Diabetes mellitus
26. Squamous cell carcinoma of urinary bladder is predisposed to by: (PGI June 2002)
- Urolithiasis
 - Persistent urachus
 - Schistosomiasis
 - Polyp
 - Smoking
27. In a survey, many children are examined and were found to have urogenital abnormalities. Which congenital anomaly is associated with increased risk of bladder carcinoma? (AIIMS Nov 97)
- Medullary sponge kidney
 - Bladder exstrophy
 - Unilateral renal agenesis
 - Doubler ureter

28. True about transitional cell carcinoma of urinary bladder: (PGI Dec 2003)
- Smoking predisposes
 - Schistosoma infection predisposes
 - Aniline dye workers
 - Radiation
29. All are precancerous for carcinoma bladder except: (Recent Question 2015, All India 91)
- Tuberculosis bladder
 - Aniline dyes
 - Schistosomiasis
 - Chronic ulcer
30. 'Kiss cancer' of the urinary bladder is: (AIIMS 80, 81, UPSC 88)
- Highly malignant
 - Malignant
 - Benign
 - Pre-malignant
31. Associated with urinary bladder carcinoma are all of the following except: (MCI Sept 2009)
- Smoking
 - HPV infection
 - Schistosomiasis
 - Cyclophosphamide
32. A 63-year old male from the middle east presented with hematuria. The urine showed RBCs but no RBC casts. BUN level was normal. cystoscopy revealed an irregular growth on the mucus of the bladder. A biopsy from this growth revealed features of squamous cell carcinoma. The etiology of this condition is most likely linked to: (COMEDK 2014)
- Cigarette smoking
 - HPV infection
 - Parasitic infection
 - Chronic alcohol abuse

CARCINOMA URINARY BLADDER: TYPES

33. SCC of bladder is best treated by: (GB Pant 2011)
- Chemotherapy
 - Radical cystectomy
 - Radiotherapy
 - TUR
34. Most common bladder tumor: (GB Pant 2011)
- TCC
 - SCC
 - Rhabdomyosarcoma
 - Sarcoma
35. Most common tumor of urinary bladder is: (DNB 2008, PGI June 97)
- Squamous cell carcinoma
 - Adenocarcinoma
 - Transitional carcinoma
 - Stratified squamous carcinoma
36. Most malignant carcinoma of the bladder is: (APPG 85)
- Malignant villous tumour
 - Solid tumour
 - Carcinomatous ulcer
 - Adenocarcinoma
37. It is true of carcinoma of the urinary bladder that: (AIIMS 85)
- It usually occurs in childhood
 - Occurs more often in aniline dye workers
 - It is located most frequently in the trigone
 - Papillary formation is rare
38. Bladder tumors mostly arises from: (All India 91)
- Mucosa
 - Submucosa
 - Muscularis mucosa
 - Serosa
39. About transitional cell carcinoma of bladder following is correct: (DPG 86, PGI 86)
- Most common site is fundus
 - Prognosis is excellent if muscle layer is invaded
 - Exposure to industrial carcinogens predisposes
 - Most of carcinomas are flat, solid and deeply infiltrating

CARCINOMA URINARY BLADDER: CLINICAL FEATURES AND DIAGNOSIS

40. A 55 years old smoker presents with history of five episodes of macroscopic hematuria each lasting for about 4–5 days in the past five years. Which of the following investigations should be performed to evaluate the suspected diagnosis?
 - a. Urine microscopy and cytology (All India 2011)
 - b. X-ray KUB
 - c. Ultrasound KUB
 - d. DTPA scan
41. CA urinary bladder commonly presents as: (PGI Dec 2003)
 - a. Hematuria
 - b. Frequency
 - c. Dysuria
 - d. Abdominal lump
42. Most constant and persistent feature of CA bladder is: (PGI Dec 95)
 - a. Increased frequency
 - b. Hematuria
 - c. Recurrent UTI
 - d. Pain abdomen
43. What is true about carcinoma bladder? (AIIMS June 94)
 - a. Common in smokers
 - b. Commoner in females than that in males
 - c. Mostly adenocarcinoma
 - d. Pain in suprapubic region is the first symptom
44. A 60 years old smoker came with a history of painless gross hematuria for one day. Most logical investigation would be: (All India 2007)
 - a. Urine routine
 - b. Plain X-ray KUB
 - c. USG KUB
 - d. Urine microscopy for malignant cytology
45. A 60-years old smoker came with the history of painless gross hematuria for one day. The investigation of choice would be: (AIIMS Nov 2006)
 - a. Urine routine and microscopy
 - b. Plain X-ray KUB
 - c. USB KUB
 - d. Urine for malignant cytology
46. An elderly male presents with one episode of gross hematuria. All of the following investigations are recommended for this patient except: (All India 2007)
 - a. Cystoscopy
 - b. Urine microscopy for malignant cells
 - c. Urine tumor markers
 - d. Intravenous pyelogram
47. Urinary cytology is a useful screening test for the diagnosis of: (AIIMS 88)
 - a. Renal cell carcinoma
 - b. Wilm's tumour
 - c. Urothelial carcinoma
 - d. Carcinoma prostate
- c. History of smoking is not a risk factor
- d. There is no role of chemotherapy
50. BCG is used in the treatment of: (MHPGMCET 2006)
 - a. Carcinoma cervix
 - b. Carcinoma colon
 - c. Carcinoma of urinary bladder
 - d. All
51. pT2, pT3 or CIS carcinoma bladder not responding to BCG is best treated by: (MHSSMCET 2008)
 - a. Intravesical mitomycin-C and interferon
 - b. Systemic chemotherapy
 - c. Cystoscopic
 - d. Radical cystectomy
52. Treatment of choice for bladder pTa: (MHSSMCET 2010)
 - a. Endoscopic tumor resection
 - b. Endoscopic tumor resection and intravesical chemotherapy
 - c. Partial cystectomy with intravesical
 - d. Radical cystectomy with or without radical radiotherapy BCG
53. Which of the following is the most effective intravesical therapy for superficial bladder cancer? (AIIMS Nov 2005)
 - a. Mitomycin
 - b. Adriamycin
 - c. Thiotepa
 - d. BCG
54. Which of the following is not an intravesical chemotherapeutic agent? (UPSC 2005)
 - a. Mitomycin C
 - b. BCG
 - c. Epirubicin
 - d. Thiotepa
55. A 65 years old male smoker presents with gross total painless hematuria. The most likely diagnosis is: (All India 2003)
 - a. Carcinoma of urinary bladder
 - b. Benign prostatic hyperplasia
 - c. Carcinoma prostate
 - d. Cystolithiasis
56. BCG is used in tumour therapy: (JIPMER 98)
 - a. Bladder
 - b. Stomach
 - c. Esophagus
 - d. Colon
57. A 60 years old female presented with hematuria and diagnosed transitional cell carcinoma of bladder stage T1N1M0. Best treatment modalities is: (UPPG 2008)
 - a. Transurethral resection
 - b. Transurethral resection and intravesical chemo-immunotherapy
 - c. Total cystectomy and pelvic lymphadenectomy
 - d. Systemic chemotherapy
58. Identify the false statement regarding urothelial cell carcinoma of the bladder: (APPG 2016)
 - a. Ileal conduit diversion is required after cystectomy
 - b. Intravesical chemotherapy and immunotherapy are not found to be beneficial in Non Muscular Invasive Bladder Cancer (NMIBC)
 - c. Radical cystectomy following chemotherapy has been shown to be of benefit in Muscle Invasive Bladder Cancer
 - d. Strongly associated with smoking & Schistosoma hematobium

CARCINOMA URINARY BLADDER: TREATMENT

48. Treatment of choice for low grade superficial bladder carcinoma: (JIPMER 2011)
 - a. Local excision
 - b. Radical cystectomy
 - c. Intravesical BCG
 - d. Chemotherapy
49. A lady who presented with hematuria was found to have Stage II Transitional Cell Carcinoma of bladder. Which of the following statements about management of her condition is true?
 - a. Cystoscopic fulguration is the standard treatment
 - b. 70% chance of requiring cystectomy in 5 years after TURP

URINARY BLADDER INJURY

59. A person after pelvic fracture could not pass urine. On examination bladder is not palpable. What is probable diagnosis? (PGI Dec 2008)
 - a. Posterior urethra rupture, with-retention of urine
 - b. Rectourethral injury

- c. Intraperitoneal rupture of bladder
- d. Extraperitoneal rupture of bladder

60. True about extraperitoneal urinary bladder rupture is all except: (MHPGMCET 2002)

- a. Associated with fracture
- b. More common than intraperitoneal bladder rupture pelvis in about 70% cases
- c. Commonly associated with anterior urethral rupture
- d. Can be managed conservatively without surgical intervention

61. Urine gests collected in which place in case of extraperitoneal rupture of bladder: (AIIMS Nov 95)

- a. Groin
- b. Below urogenital diaphragm
- c. Above urogenital diaphragm
- d. Perineal space

62. In extraperitoneal rupture of bladder, urine extravasates in: (AIIMS Nov 94, All India 93)

- a. Groin
- b. Intraperitoneal region
- c. Extraperitoneal region
- d. Perivesical space

63. Tear-drop bladder is seen in: (PGI June 99)

- a. Tuberculosis
- b. Hunner's ulcer
- c. Perivesical hemorrhage with rupture
- d. Perivesical hemorrhage without rupture

64. Most reliable investigation in bladder rupture is

- a. IVP
- b. Cystoscopy (JIPMER 87)
- c. Retrograde cystogram
- d. Catheterization

URINARY DIVERSION

65. In ureterosigmoidostomy all occur except: (JIPMER 98)

- a. Hyponatremia
- b. Hyperkalemia
- c. Hyperchloremia
- d. Acidosis

66. Urinary diversion is indicated in the following except: (MHSSMCET 2008)

- a. Ectopia vesicae
- b. Carcinoma bladder
- c. Neurogenic bladder
- d. Bladder hematoma

67. Which among the following will complicate as hyperchloremic acidosis? (AIIMS June 98)

- a. Ureterosigmoidostomy
- b. Diarrhea
- c. Vomiting
- d. Ileoplasty

URINARY INCONTINENCE

68. Urinary incontinence results from all except:

- a. Neurogenic bladder
- b. Vesico vaginal fistula
- c. Ectopic ureter
- d. Rectovesical fistula

69. Postmicturition dribbling is due to: (AMU 2005)

- a. Detrusor
- b. Dribbling decreased in case of urethral stricture
- c. Collection of urine in 'U' shaped curve of bulb of penis
- d. Neurogenic bladder

70. To differentiate between stress incontinence and detrusor instability investigation done is: (AIIMS June 97)

- a. Cystosurethroscopy
- b. Urodynamic study
- c. MCU
- d. Retrograde urethroscopy

71. In which case cystometric study is indicated? (AIIMS Nov 98)

- a. Neurogenic bladder
- b. Stress incontinence
- c. Fistula
- d. Urge incontinence

MISCELLANEOUS

72. Which is a normal finding in cystometry? (PGI 97)

- a. Absence of systolic detrusor contraction
- b. Residual volume of 75 ml
- c. Leakage on coughing
- d. First sensation of urination at 300 ml

73. Commonest cause for pulsion diverticulum of the urinary bladder is: (JIPMER 86)

- a. Benign enlargement of prostate
- b. Fibrous prostate
- c. Contracture of bladder neck
- d. Stricture urethra

74. Catheterization of bladder done in: (PGI Dec 2006)

- a. CA prostate
- b. Postoperative retention
- c. Preoperative before taking the patient for appendicitis
- d. Stricture
- e. Rupture

75. A young lady presents with symptoms of urinary tract infection. All of the following findings on a midstream urine sample support the diagnosis of uncomplicated acute cystitis, except: (All India 2011)

- a. Positive nitrite test
- b. CFU count < 1000/ml
- c. Detection of one bacteria/field on Gramstain
- d. > 10 WBC/HPF

76. Normal intravesical pressure during voiding: (MHPGMCET 2007)

- a. 20–35 cm H₂O
- b. 35–50 cm H₂O
- c. 50–65 cm H₂O
- d. 65–80 cm H₂O

77. What is Marion's disease? (MHSSMCET 2005)

- a. Benign prostatic hypertrophy
- b. Superficial thrombophlebitis of breast
- c. Bladder outlet obstruction
- d. Interstitial cystitis

78. Marion's disease is due to: (AIIMS 81, DNB 90)

- a. Muscular hypertrophy of internal sphincter of urinary bladder
- b. Fibrosis of the neck of bladder
- c. Vesicular diverticula
- d. Vesicular calculi

79. What is Boari's FLAP surgery? (MHSSMCET 2005)

- a. Ureterostomy
- b. DJ stent in situ
- c. Bowel interposition
- d. Flap of the bladder wall fashioned into a tube replace lower ureter

80. In Boari operation: (GB Pant 2011)

- a. Ureteric retransplant
- b. Lower ureteric reconstruction
- c. Diversion
- d. Bowel interposition

81. Interstitial cystitis is also known as: (DNB 2012)

- a. Eosinophilic cystitis
- b. Radiation cystitis
- c. Hunners, cystiti's
- d. Tubercular cystitis

82. All are seen in cystitis except: (DNB 2014)

- a. Fever
- b. Hematuria
- c. Dysuria
- d. Nocturia

EXPLANATIONS

ECTOPIA VESICAE

1. Ans. d. Iliac bone (Ref: Smith 17/e p574-575; Campbell's 10/e p3228-3236; Bailey 26/e p1310, 25/e p1314)

Posterior iliac osteotomy is done in ectopia vesicae.

EXTROPHY OF BLADDER (ECTOPIA VESICAE)

- Extrophy of bladder is **complete ventral defect** of **Urogenital sinus** and the **overlying skeletal system**^Q.
- Defect in the infraumbilical part** of the **anterior abdominal wall**, associated with **incomplete development** of the **anterior wall of the bladder**^Q.

Embryology

- The **basic defect** is **abnormal overdevelopment** of the **cloacal membrane** and its **rupture**.
- The **timing of this rupture** of this **defective cloacal membrane** **determines the variant** of the **extrophy-epispadias complex** that results.

Clinical Features

- The **posterior wall of the bladder protrudes through the defect** with mucosal edges fused with skin and **urine spurts** onto the abdominal wall from the **ureteral orifices**^Q.
- The **rectus muscles** which are inserted on the pubic rami are also **widely separated**^Q.
- An **umbilical hernia**^Q though usually small is present along with extrophic bladder.

- In males, **complete epispadias** with a **wide and shallow scrotum**. **Undescended testis** and **inguinal hernias**^Q are common.
- Females also have **epispadias** with **bifid clitoris** and **wide separation** of the **labia**^Q.

- The **anus** is **dislocated anteriorly** in both sexes and there may be **rectal prolapse**^Q.

Complications

- The consequences of untreated bladder extrophy are **total urinary incontinence**^Q and an increased incidence of bladder cancer, usually **adenocarcinoma**.
- Many untreated extrophy of bladder reveal fibrosis, derangement of muscularis mucosa and chronic infection leading to **hydronephrosis**^Q.

Treatment

- Enterocystoplasty**^Q is the method of choice to augment bladder capacity and aid in reservoir function.
- Urinary diversion with cystectomy**^Q is treatment of choice for small, fibrotic or inelastic bladder.
- Complete reconstruction** is achieved by:
 - Bladder closure with **sacral osteotomy** and **lengthening of penis**^Q (**Posterior iliac osteotomy**^Q is done in ectopia vesicae)
 - Antireflux procedure with **bladder neck reconstruction**^Q
 - Repair of **epispadiac penis**^Q

2. Ans. a. Hypospadias 3. Ans. b. Cloacal membrane is present
 4. Ans. c. Hypospadias 5. Ans. b. Ventral curvature of penis
 6. Ans. b. Iliac bone

URINARY BLADDER STONES

7. Ans. b. Uric acid stones are dropped from above (Ref: Smith 17/e p272-273; Campbell 10/e p2521-2527; Bailey 26/e p1320-1322, 25/e p1323-1325)

Vesical Calculus	
Primary Bladder Calculi	Secondary Bladder Calculi
<ul style="list-style-type: none"> Develop in absence of any known functional, anatomic or infectious factors^Q 	<ul style="list-style-type: none"> Develop in concert with bladder outlet obstruction^Q, infection, impaired bladder emptying or a foreign body.

8. **Ans. c. Infection** (Ref: Smith 17/e p272-273; Campbell 10/e p2522-2524; Bailey 26/e p1320-1322, 25/e p1323-1325; emedicine.medscape.com/article/2120102-overview)

PATHOPHYSIOLOGY OF BLADDER STONES

- **Most vesical calculi** are **formed de novo within the bladder**^Q, but some initially may have formed within the kidneys as a dissociated Randall plaque or on a sloughed papilla and subsequently may have passed into the bladder, where additional deposition of crystals cause the stone to grow.
 - **Most renal stones** that are **small enough to pass through the ureters** are also **small enough to pass through a normally functioning bladder** and an **unobstructed urethra**^Q.
- In **older men with bladder stones** composed of **uric acid**, the stone **most likely formed in the bladder**^Q.
- Stones composed of **calcium oxalate** are usually **initially formed in the kidney**^Q.
 - In **adults, MC type of vesical stone** (seen in >50% of cases) is **composed of uric acid**^Q.
- Less frequently, bladder calculi are composed of calcium oxalate, calcium phosphate, ammonium urate, cystine, or magnesium ammonium phosphate (when associated with infection).

Endemic Bladder Calculi

- In **children, stones** are composed mainly of **ammonium acid urate**^Q, **calcium oxalate**, or an impure mixture of ammonium acid urate and calcium oxalate with calcium phosphate.
 - The common link among endemic areas relates to **feeding infants human breast milk and polished rice**^Q.
 - These foods are **low in phosphorus**, ultimately leading to **high ammonia excretion**^Q.
 - These children also usually have a **high intake of oxalate-rich vegetables** (increased oxalate crystalluria) and **animal protein (low dietary citrate)**^Q.
- **Vesical calculi** may be single or multiple, especially in the presence of bladder diverticula, and can be small or large enough to occupy the entire bladder. They **range from soft to extremely hard**, with **surfaces** ranging from **smooth** and **faceted** to **jagged** and **spiculated** ("jack" stones)^Q.

SECONDARY BLADDER CALCULI

- **Most bladder stones** are secondary, more common in **older males**^Q (>50 years), usually because of **bladder outlet obstruction**^Q.
- **MC type: Uric acid** (sterile urine) > **Struvite stones**^Q (Infected urine)
- Bladder stones are **usually solitary**^Q, multiple in 25% patients.

Etiology

- Bladder outlet obstruction (MC cause)^Q
- **Neurogenic bladder**^Q
- Foreign body (**Foley's catheter**, forgotten **DJ stents**)^Q
- Bladder **diverticula**^Q

Clinical Features

- Typical symptoms are **intermittent, painful voiding** and **terminal hematuria** with **severe pain at the end of micturition**^Q.
- **Pain** may be referred to the **tip of the penis** or to the **labia majora**^Q.

Diagnosis

- A large percentage of bladder stones are **radiolucent (uric acid)**^Q.
- **USG bladder**: Identifies the stone with its **characteristic shadowing** and stone moves with **changing body position**^Q.

Treatment

- **Small stones**: Removed or crushed transurethrally (**Cystolitholapexy**)^Q
- **Larger stones**: Disintegrated by **transurethral electrohydraulic lithotripsy** or **Cystolithotomy**^Q

Stones of Genitourinary Tract

- **MC renal stone**: **Calcium oxalate**^Q
- **MC primary bladder stone**: **Ammonium urate**^Q
- **MC bladder stone**: **Uric acid**^Q > **Struvite**
- **MC prostate stone**: **Calcium phosphate**^Q

Maximum stones are radiopaque

9. Ans. a. Rare in Indian children (Ref: Smith 17/e p272-273; Campbell 10/e p2522; Bailey 26/e p1320-1322, 25/e p1323-1325)

PRIMARY BLADDER CALCULI (ENDEMIC BLADDER CALCULI)

- Mainly seen in **underdeveloped countries**^Q (North Africa, Thailand, Burma, Indonesia), in **pediatric age** group.
 - Most common in children <10 years, with a peak incidence at 2 to 4 years of age.
- More common in boys than in girls.
- Common in **Rajasthan, Andhra Pradesh**^Q and some north-eastern states of **India**.
 - Related to **chronic dehydration** and **low protein, low phosphate, exclusive milk** and **high carbohydrate diet**^Q.
 - Low phosphate diet increases urinary ammonium excretion leading to **ammonium urate stones**^Q.

Diagnosis

- USG bladder: Identifies the stone with its **characteristic shadowing** and stone moves with **changing body position**.

Treatment

- Small stones:** Removed or crushed transurethrally (**Cystolitholapexy**)^Q
- Larger stones:** Disintegrated by **transurethral electrohydraulic lithotripsy** or **Cystolithotomy**^Q
 - Primary bladder calculi rarely recur after treatment^Q.

10. Ans. c. Uric acid 11. Ans. b. Treatment is litholapexy 12. Ans. d. Bladder

13. Ans. a. Always associated with recurrence (Smith 17/e p272-273; Campbell 10/e p2522; Bailey 25/e p1323-1325)

"Primary bladder calculi are more common in children exposed to low-protein, low-phosphate diets. Primary bladder calculi rarely recur after treatment." - Campbell 10/e p2522

"Childhood bladder lithiasis remains common in endemic regions, throughout a stone belt reaching from northern Africa, through the Middle East and the Balkans, and into India, Japan, Thailand, and Indonesia." - Campbell 10/e p2522

Primary bladder calculi are most common in children younger than the age of 10, with a **peak incidence at 2 to 4 years of age**. The disease is much **more common in boys** than in girls.

"Stones are usually solitary and, once removed, rarely recur." - Campbell 10/e p2522

Ammonium acid urate, calcium oxalate, uric acid, and calcium phosphate are the most common components of primary bladder calculi." - Campbell 10/e p2522

Children in endemic regions often consume a predominantly cereal-based diet that is poor in animal protein and low in phosphate." - Campbell 10/e p2522

"Low dietary intake of phosphate not only leads to hypophosphaturia but also to hyperammonuria, promoting the precipitation of both calcium oxalate and ammonium acid urate." - Campbell 10/e p2522

URINARY BLADDER: MALACOPLAKIA

14. Ans. d. Defect in phagocytosis (Ref: Smith 17/e p207-208; Campbell 10/e p309-311)

MALACOPLAKIA

- Inflammatory disease of the bladder that can also affect ureters and kidneys
- In the bladder, it manifests as plaques or nodules made of **large histiocytes (von Hanseman cells)**^Q with laminar **inclusion bodies (Michaelis-Gutmann bodies)**^Q form around bacterial fragments (E. coli) which acts as nidus.
- Believed to result from the **inadequate killing** of bacteria by **macrophages** or **monocytes** that exhibit **defective phagolysosomal activity**^Q.

Risk Factors

- Immunosuppression** (Steroids, Transplantation)^Q
- Diabetes, Lymphoma, Rheumatoid arthritis**^Q

Clinical Features

- More commonly affects **women** and associated with a history of **UTI**.

- Patients with malacoplakia often have **chronic illness** or are **immunosuppressed**.^Q
- Irritative voiding symptoms (**urgency** and **frequency**) and **hematuria** are common

Diagnosis

- **USG or CT** may demonstrate a **mass in the bladder** and **evidence of obstruction** if the disease extends to the ureter.
- **Culture** of the lesion can yield bacteria, most commonly **E. coli**.

Management

- **TMP-SMX** and **fluoroquinolones**^Q are recommended in the treatment of malacoplakia.
- In **malacoplakia limited** to the **lower urinary tract**, **antibiotic therapy** alone is usually sufficient.
- Best chance of **cure: Antibiotics + Surgery**^Q
- The **prognosis is poor** and **mortality rate is high** in patients having **bilateral renal involvement**, regardless of treatment.

15. Ans. c. Michaelis-Gutmann bodies are characteristic feature

URINARY BLADDER: TUBERCULOSIS

16. Ans. d. Whitish efflux from the ureteric holes (Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301-1303, 25/e p1306-1308)

GENITOURINARY TUBERCULOSIS

- Tubercle bacilli (**M. tuberculosis**) may invade one or more organs of genitourinary tract and cause **chronic granulomatous infection**.^Q
- More common in **males**^Q (young adults of age **20-40** years)
- **Vesical irritability** is an **early clinical manifestation**.^Q

Complications

- **Scarring with stricture formation**^Q is one of the most typical lesions of tuberculosis and most commonly affects **juxtavesical portion of ureter**.
- **Inflammation of bladder mucosa** in early stages → **tubercle formation** (seen endoscopically as **white** or **yellow raised nodules**)^Q surrounded by halo of hyperemia → Mural fibrosis (**Thimble bladder**)^Q

Clinical features

- Earliest symptom is **urinary frequency**

Diagnosis**IVP in Tuberculosis**

- **Earliest sign** is "**moth-eaten**" **calyx**^Q (Obliteration of clear cut outline of renal papilla) due to erosion.
- **Obliteration** of one or more **calyces** (caliectasis, hydronephrosis)
- SOL in pelvis (**TB abscess**) seen as **splaying of calyces**^Q
- **Ureteric strictures**^Q (single or multiple)
- **Shrunken bladder** with irregular wall (**Thimble bladder**)^Q
- Absence of function of kidney due to complete ureteral occlusion and renal destruction (**autonephrectomy**)^Q

- **RGP**: Extensive calcification or thickness of the ureter (**Pipe-stem ureter**)^Q, are usually associated with **pyonephrosis**.

Cystoscopy in Tuberculosis

- **Earliest sign** is **pallor**^Q around ureteric orifice.
- Other features are **tubercular ulcer** and **golf hole ureteric orifice**^Q.

- **CECT** is **IOC** for **genitourinary tuberculosis**^Q.

Treatment ATT and Surgery (for complications)^Q

17. Ans. b. Chronic tuberculosis

18. Ans. c. Ileocystoplasty

SCHISTOSOMIASIS

19. Ans. a. Schistosomiasis (Ref: Smith 17/e p227-235; Campbell 10/e p480-486; Bailey 26/e p1328-1329, 25/e p1332-1333)

SCHISTOSOMIASIS (BILHARZIASIS)

- Schistosomiasis is an infection with *Schistosoma haematobium*^Q.
- Endemic in **Africa, Egypt and Middle East**
- More common in **Males**^Q

Lifecycle

- **Man**^Q is the **only definitive host** and **intermediate host** is **snail**^Q.
- Life cycle begins with the passage of **eggs** into **freshwater** regions through **urine**^Q.
- When the **eggs** are hatched, **miracidia** are produced. These **penetrate** the **snail** and eventually form into **cercariae**.

• **Eggs** → **Miracidium**^Q (penetrate the snail) → **Cercaria**^Q (penetrate skin of man) → Migrate to **vesical venous plexus**^Q for reproduction → **Eggs in urine**^Q

- The fluke embryos (**cercariae**) **penetrate** the **skin** of man from infected water and migrate to the **vesical venous plexus**, where **sexual reproduction** takes place^Q.
- The **eggs** are laid in the **submucosal veins** and **penetrate** the **bladder wall** to enter the **urine**^Q.

Pathology

- *Schistosoma* **eggs** are **highly antigenic** and induce **intense granulomatous reaction** in bladder resulting in **bladder fibrosis** with **ureteric or urethral strictures**^Q.
- **Calcification** of the **dead eggs** within the bladder can produce a **calcified bladder** or **bladder stones**^Q.

Complications

- **Bladder calcification**: **Schistosomiasis** is the **MC cause**^Q of bladder calcification worldwide.
- Urolithiasis, ascending urinary tract infection, urethral and ureteric structure with subsequent hydronephrosis, and renal failure.
- **Squamous cell carcinoma**^Q (Most serious complication)

Symptoms

- **MC symptom** of urinary schistosomiasis is **urinary frequency**^Q.

- **Swimmer's itch** is the **first clinical sign** due to local inflammatory response from **cercarial penetration** (<24 hours)^Q
- **Katayama fever** (Acute schistosomiasis)^Q: Generalized allergic reaction associated with onset of egg laying, which includes fever, urticaria, lymphadenopathy, hepatosplenomegaly and eosinophilia (**3 weeks to 4 months**)

- Acute inflammation phase when eggs are deposited, penetrate tissues and excreted (**hematuria, frequency and terminal dysuria**)
- Fever, rigor, toxemia and uremia are manifestations of renal involvement
- Signs:
 - In early uncomplicated cases, there are essentially no clinical findings.
 - In **advanced cases**, rectal examination may reveal a **fibrosed prostate, enlarged seminal vesicle** or **thickened bladder base**^Q.

Diagnosis

- Demonstration of schistosomal **eggs** in **early morning urine sample**^Q
- **Sandy patches** (eggs in trigone) on **cystoscopy**^Q
- IVU, RGU or cystography may show **mucosal irregularity**, inflammatory pseudo polyps, ureteritis cystica, **ureteral dilation and stricture, reduced bladder capacity**^Q

- **Calcification** in the **wall of the bladder** or distal ureters on **plain radiographs** (**Fetal head appearance**)^Q
- **Calcifications** of the **distal ureters** have a characteristic pattern of **linear or parallel calcifications**^Q on plain radiographs

Treatment

- **Praziquantel**^Q (DOC), **metrifonate**^Q or **oxaminiquine**^Q are the drugs used in schistosomiasis.
- Surgery to treat the bladder contraction or for resection of the bladder cancer.

20. Ans. b. Schistosomiasis

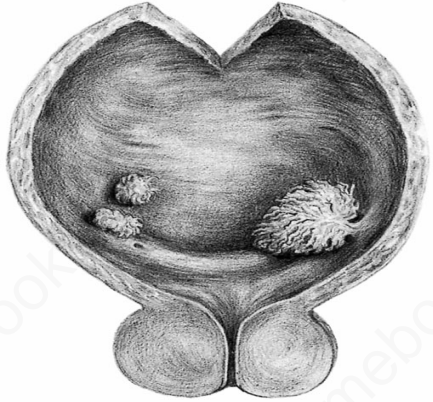
21. Ans. c. Schistosomiasis

CARCINOMA URINARY BLADDER: RISK FACTORS

22. Ans. c. Urinary bladder (Ref: Smith 17/e p308; Campbell 10/e p2312-2316; Bailey 26/e p1330, 25/e p1333)

Risk factors for Carcinoma Urinary Bladder	
Transitional Cell Carcinoma	Squamous Cell Carcinoma
<ul style="list-style-type: none"> • Cigarette smoking^Q: main etiological factor, account for about 50% bladder cancer • Occupational exposure to chemicals: Naphthylamine, benzidine, acrolein, aniline dyes, hydrocarbons^Q (BHAAM) • Schistosoma hematobium^Q: Risk factor for both TCC and SCC, more for SCC • Drugs: Phenacetin and Chlornaphazine^Q • Cyclophosphamide^Q • Pelvic irradiation^Q • Occupations associated with increased risk: Chemical, dye, rubber, petroleum, leather and printing industry workers^Q 	<ul style="list-style-type: none"> • Schistosoma hematobium^Q: risk factor for both TCC and SCC, more for SCC • Chronic irritation: Urinary calculi, long term indwelling catheters, chronic urinary tract infections^Q • Bladder diverticula^Q

23. Ans. a. Analgesic nephropathy
 24. Ans. a. Schistosomiasis; b. Naphthylamine; c. Smoking
 25. Ans. a. Stone; b. Schistosomiasis; c. Chronic cystitis
 26. Ans. a. Urolithiasis; c. Schistosomiasis
 27. Ans. b. Bladder exstrophy
 28. Ans. a. Smoking predisposes; b. Schistosoma infection predisposes; c. Aniline dye workers; d. Radiation
 29. Ans. a. Tuberculosis bladder; d. Chronic ulcer
 30. Ans. c. Benign (Ref: Bailey 26/e p1330, 25/e p1334)

Benign Papillary Tumour	
<ul style="list-style-type: none"> • 'Kiss' cancer: Papillary tumour with daughter implantation • The papilloma consists of a single frond with a central vascular core with villi; it looks like a red sea anemone • Inverted papilloma is a condition in which the proliferative cells penetrate under normal mucosa so that the lesion is covered with smooth urothelium. • It is benign. 	

31. Ans. b. HPV infection
 32. Ans. c. Parasitic infection

CARCINOMA URINARY BLADDER: TYPES

33. Ans. b. Radical cystectomy (Ref: Smith 17/e p308-311; Campbell 10/e p2317; Bailey 26/e p1330-1335, 25/e p1333-1335)

Types of Carcinoma Urinary Bladder		
Transitional Cell Carcinoma	Squamous Cell Carcinoma (Bilharzial carcinoma) ^Q	Adenocarcinoma Urinary Bladder
<ul style="list-style-type: none"> • More than 90% of bladder cancer are TCC^Q • Most commonly appear as papillary or exophytic lesions^Q 	<ul style="list-style-type: none"> • Account for 5–10%, arise from lateral bladder wall and dome^Q • Often nodular and invasive^Q at the time of diagnosis • Do not respond to TURBT, partial cystectomy or chemotherapy • Treatment is Radical cystectomy^Q • Stage to stage and grade to grade prognosis is same as TCC 	<ul style="list-style-type: none"> • Account for < 2% bladder cancer • Urachal remnants and ectopia vesicae are risk factors^Q • Three types: primary vesical, urachal and metastatic^Q • Adenocarcinoma also occur in intestinal urinary conduits, augmentations, pouches and ureterosigmoidostomies^Q • Primary adenocarcinoma arise along the floor whereas adenocarcinoma arising from urachus occur at the dome • Treatment: Radical cystectomy with pelvic lymphadenectomy^Q • Poor response to chemotherapy and radiotherapy

34. Ans. a. TCC
 35. Ans. c. Transitional carcinoma
 36. Ans. b. Solid tumour (Ref: Bailey 26/e p1333, 25/e p1336)

- **Muscle-invasive tumours** are **nearly always solid** although there may be a low tufted surface.
- These tumours are **often large** and **broad based^Q**, having an irregular, ulcerated, appearance within the bladder.
- The **incidence of metastases**, whether from lymphatic invasion in the pelvis or blood-borne to the lung, liver or bones, is **much more common** and will cause the **death of 30–50% of patients^Q**.

SQUAMOUS CELL TUMOURS

- Squamous cell tumours tend to be solid and are nearly always associated with muscle invasion^Q.
- This is the most prevalent form of bladder cancer in areas where bilharzia is endemic.
- Squamous cell tumours may be associated with chronic irritation caused by stone disease in the bladder as a result of metaplasia^Q.

37. Ans. b. Occurs more often in aniline dye workers, c. It is located most frequently in the trigone

38. Ans. a. Mucosa

39. Ans. c. Exposure to industrial carcinogens predisposes

CARCINOMA URINARY BLADDER: CLINICAL FEATURES AND DIAGNOSIS

40. Ans. a. Urine microscopy and cytology (Ref: Smith 17/e p308-315; Campbell 10/e p2311-2332; Bailey 26/e p1333-1338, 25/e p1333-1340)

CARCINOMA URINARY BLADDER

- More common in whites, higher socio-economic status and in males^Q, in 6th and 7th decade
- 75% are localized to bladder and 25% have spread to regional nodes or distant sites at the time of presentation
- Most tumors develop at trigone and adjacent posterolateral wall^Q with ureteral involvement
- Tumors tend to be multifocal^Q in bladder

Pathology

- MC type grossly is papillary and histologically, TCC^Q

Precursor lesions of invasive urothelial cancer

- Non-invasive papillary tumor (Kiss ulcer)^Q causes painless, profuse paroxysmal hematuria
- Carcinoma in situ (Malignant cystitis)^Q

Carcinoma in situ (Malignant cystitis)

- Typically presents as irritative^Q lower urinary symptoms
- Common in high grade^Q tumors
- Urinary cytology is IOC^Q
- Urine cytology is positive in 80–90% cases because of poor cohesiveness of cells
- Associated with increased chances of recurrence and poor prognosis
- Treatment: two cycles of BCG^Q, radical cystectomy in cases recurrence

Clinical Features

- MC symptom: Painless hematuria^Q (85% cases)
- Hematuria is gross or microscopic, intermittent^Q rather than constant
- Vesical irritability^Q: frequency, urgency and dysuria
- Bone pain and abdominal pain in advanced disease
- MC site of lymphatic metastases: Pelvic lymph nodes (obturator is MC)^Q
- MC site of hematogenous spread: liver^Q > lung

Diagnosis**Cystoscopy**

- Diagnosis and initial staging is made by cystoscopy and transurethral resection (TUR)^Q
- Urinary Cytology
- Cytologic examination of exfoliated cells are useful in detecting cancer in symptomatic patients and assessing response to treatment^Q
- Most useful for early diagnosis of recurrence in TCC^Q

Exfoliated Markers for detection of bladder cancer

- Newer urinary tumor markers like BTA test, urinary nuclear matrix protein (NMP22) can detect cancer specific proteins in urine (BTA/NMP22)^Q
- Hyaluronidase, Lewis-X antigen on exfoliated urothelial cells
- Determination of telomerase activity in exfoliated cells
- Have been used to detect new index tumors and recurrent tumors^Q
- Expected to play important role in near future

- CT and MRI: used for staging^Q

- **Cystoscopy and TUR or biopsy; further management is based on stage, grade, size, multiplicity and recurrence pattern^Q**

- There is strong correlation between **tumor grade and stage** and tumor recurrence, progression and survival
- In patients with **organ confined disease**, presence of **lymph node metastases** appears to be the **most important prognostic factor**
- Presence of **lymphovascular invasion** is associated with **poor prognosis**^Q

41. Ans. a. Hematuria
42. Ans. b. Hematuria
43. Ans. a. Common in smokers
44. Ans. d. Urine microscopy for malignant cytology
45. Ans. d. Urine for malignant cytology
46. Ans. c. Urine tumor markers
47. Ans. c. Urothelial carcinoma

48. **Ans. a. Local excision** (Ref: Smith 17/e p314; Campbell 10/e p2320-2321, 2375-2385; Bailey 26/e p1334-1336, 25/e p1338-1340)

7 th AJCC (2010) TNM Staging for CA Bladder	
T: Primary tumor	N: Regional lymph nodes
Ta: Non-invasive papillary carcinoma Tis: Carcinoma in situ “Flat tumor”	N1: Single regional LN in true pelvis (hypogastric, obturator, external iliac or presacral LN)
T1: Tumor invades subepithelial connective tissue	N2: Multiple regional LN in true pelvis (hypogastric, obturator, external iliac or presacral LN)
T2a: Superficial muscularis propria invasion (inner half) T2b: Deep muscularis propria invasion (outer half)	N3: LN metastasis to common iliac LNs
T3a: Microscopic extension into perivesical fat T3b: Macroscopic extension into perivesical fat	M: Distant metastases
T4a: Cancer invading pelvic viscera (e.g., prostatic stroma, vaginal wall, rectum, uterus) T4b: Extension to pelvic sidewalls, abdominal walls, or bony pelvis	M0: No distant metastasis M1: Distant metastasis present

Treatment of CA Bladder	
Tis	Intravesical BCG ^a
Ta (single, low to moderate grade, not recurrent)	Complete TUR ^a
Ta (large, multiple, high grade or recurrent) and T1	Complete TUR followed by intravesical chemo or immunotherapy ^a
T2-T4	<ul style="list-style-type: none"> • Radical cystectomy^a • Neoadjuvant chemotherapy followed by radical cystectomy^a • Radical cystectomy followed by adjuvant chemotherapy • Neoadjuvant chemotherapy followed by concomitant chemotherapy and irradiation
Any T, N+, M+	Systemic chemotherapy followed by selective surgery or irradiation

49. **Ans. b. 70% chance of requiring cystectomy in 5 years after TUR**
Treatment of stage II bladder cancer is **radical cystectomy** or **neoadjuvant chemotherapy** followed by **radical cystectomy**.
Rests of the three options are wrong.
50. **Ans. c. Carcinoma of urinary bladder**
51. **Ans. d. Radical cystectomy**
52. **Ans. a. Endoscopic tumor resection**
53. **Ans. d. BCG** (Ref: *Smith 17/e p316; Campbell 10/e p2361-2365; Bailey 26/e p1334, 25/e p1337*)

Drugs used in intravesical chemotherapy	
<ul style="list-style-type: none"> • Mitomycin C^q • Thiotepa^q 	<ul style="list-style-type: none"> • Epirubicin^q • BCG (most effective)^q

- 54. Ans. b. BCG** (Ref: Smith 17/e p316-317; Campbell 10/e p2343-2345; Bailey 26/e p1334, 25/e p1337-1338)

BCG

- BCG is attenuated strain of *Mycobacterium bovis*^Q

- **Mechanism of action:** Immunologically mediated
 - Exact mechanism is not known
 - Binds to fibronectin on bladder cells and **elicits T_{H1} response**^Q
- **Most effective**^Q intravesical chemotherapy

Contraindications of BCG	
Absolute	Relative
<ul style="list-style-type: none"> • Immunosuppressed^Q patients • Gross hematuria^Q • Immediately after TURBT^Q • Traumatic catheterization^Q • Total urinary incontinence^Q • History of BCG sepsis^Q 	<ul style="list-style-type: none"> • Deranged LFT • Previous history of Koch's • UTI • Poor performance status

Side-Effects

- MC is **frequency, urgency and dysuria**^Q
- Patients with **severe BCG sepsis** (high fever, chills confusion, hypotension, jaundice) should be treated with **ATT**^Q.

55. Ans. a. Carcinoma of urinary bladder

56. Ans. a. Bladder

57. Ans. c. Total cystectomy and pelvic lymphadenectomy

58. Ans. b. Intravesical chemotherapy and immunotherapy are not found to be beneficial in Non Muscular Invasive Bladder Cancer (NMIBC)

URINARY BLADDER INJURY

59. Ans. d. Extraperitoneal rupture of bladder (Ref: Smith 17/e p289-291; Campbell 10/e p2153-2155; Bailey 26/e p1311, 25/e p1314-1315)

BLADDER RUPTURE

- Bladder injuries occur most often from **external force to full bladder** and often associated with **pelvic fractures**^Q.
- **Pelvic fracture** accompanies bladder rupture in **90%**^Q cases.
- Classic triad suggestive of bladder rupture: **Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria**^Q

Extraperitoneal (80%)

- MC cause is **pelvic fracture**^Q.
- Diagnosed by **cystogram** or **CT cystography**^Q

- **Flame sign** or **pear sign**^Q (pattern of contrast extravasation) is seen
- Treated by **simple catheter drainage**^Q (Typically **10 days** of catheter drainage will provide adequate healing time)

- **Surgical repair** is indicated in cases of **repeated blockade** of catheter due to bleeding, **projecting bone fragment** or **tear extending to the bladder neck**^Q.

Intraperitoneal (20%)

- **Blow, kick or fall on fully distended bladder**^Q leads to intraperitoneal rupture
- Usually seen in **males**, MC site of rent is **dome**^Q of bladder.

- Apart from classic triad suggestive of bladder rupture (Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria) patients develop **peritonism** and **abdominal distention**^Q.

- Diagnosis is made by **retrograde cystography** or **CT cystography**.
- **X-ray abdomen** shows **ground glass appearance**^Q (due to fluid in abdomen)
- **Laparotomy** with **peritoneal lavage and bladder repair** with **SPC**^Q should be done.

BLADDER RUPTURE

- Cystography (gold standard)^Q reveals distorted bladder with extravasation of contrast in perivesical space and streaks of contrast into fascial planes giving rise to typical “sun-burst” appearance^Q.
- USG shows bladder in bladder appearance^Q due to perivesical collection and rent may be detected.

60. Ans. c. Commonly associated with anterior urethral rupture (Ref: Smith 17/e p289-291; Campbell 10/e p2153-2155; Bailey 26/e p1311, 25/e p1314-1315)

Bladder Rupture	
Extraperitoneal (80%)	Intraperitoneal (20%)
<ul style="list-style-type: none"> • MC cause is pelvic fracture^Q. • Classic triad: Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria^Q • Diagnosed by cystogram or CT cystography^Q • Flame sign or pear sign^Q (pattern of contrast extravasation) is seen • Treated by simple catheter drainage (Typically 10 days of catheter drainage will provide adequate healing time)^Q • Surgical repair is indicated in cases of repeated blockage of catheter due to bleeding, projecting bone fragment or tear extending to the bladder neck^Q. 	<ul style="list-style-type: none"> • Cause: Blow, kick or fall on fully distended bladder^Q • Usually seen in males, MC site of rent is dome of bladder^Q. • Apart from classic triad suggestive of bladder rupture (Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria) patients develop peritonism and abdominal distention^Q. • Diagnosis is made by retrograde cystography or CT cystography^Q. • X-ray abdomen shows ground glass appearance^Q (due to fluid in abdomen) • Laparotomy with peritoneal lavage and bladder repair with SPC should be done^Q.

61. Ans. c. Above urogenital diaphragm

62. Ans. d. Perivesical space

63. Ans. c. Perivesical hemorrhage with rupture

64. Ans. c. Retrograde cystogram

URINARY DIVERSION

65. Ans. b. Hyperkalemia (Ref: Smith 17/e p388-401; Campbell 10/e p2436-2447; Bailey 26/e p1336-1339, 25/e p1339-1342)

URINARY DIVERSION

- Urinary diversion can lead to stricture at anastomosis, reflux of urine, reabsorption of solutes leading to dyselectrolytemia^Q.
- Gold standard conduit for urinary diversion: Ileal conduit^Q
- Ileal conduit is best for urinary diversion as it is simplest to perform^Q and associated with minimal intra-operative and immediate post-operative complications.
- Ileal or colonic conduits (Ureterosigmoidostomy):
 - Hyperchloremic, hypokalemic metabolic acidosis^Q
 - (DK Raised HCl in ureterosigmoidostomy: Decreased K⁺, raised H⁺ and Cl⁻)
- Jejunal conduits:
 - Hypochloremic, hyponatremic, hyperkalemic, metabolic acidosis^Q
 - (RH Khurana Decreases NaCl in jejunal conduit: Raised H⁺, K⁺; Decreased Na⁺, Cl⁻)
- Stomach conduit:
 - Hypochloremic, hypokalemic, metabolic alkalosis^Q
 - (Everything decreases in stomach conduit: Decreased H⁺, K⁺, Cl⁻)

66. Ans. d. Bladder hematoma (Ref: Bailey 26/e p1336, 25/e p1339)

INDICATIONS OF EXTERNAL URINARY DIVERSION

- To relieve distal obstruction^Q
- When the bladder has been removed or has lost normal neurological control^Q
- Incurable fistula^Q
- Irremovable obstruction^Q

67. Ans. a. Ureterosigmoidostomy

URINARY INCONTINENCE

68. Ans. d. Rectovesical fistula (Ref: Bailey 26/e p1316, 25/e p1320-1321)

Rectovesical fistula doesn't cause urinary incontinence, as the level of fistula is above the sphincter mechanism.

Causes of incontinence	
Problems of social control	<ul style="list-style-type: none"> Uninhibited detrusor hyperreflexia and impaired social perception in dementia^Q
Storage problems	<ul style="list-style-type: none"> Small bladder capacity owing to fibrosis (tuberculosis, radiotherapy or interstitial cystitis)^Q Small functional capacity^Q owing to severe detrusor instability, neurogenic dysfunction or infection
Impairment of emptying	<ul style="list-style-type: none"> Chronic retention^Q or neurogenic bladder dysfunction^Q have small functional bladder capacities with detrusor overactivity causing incontinence, despite having large residual volumes of urine.
Weak sphincter	<ul style="list-style-type: none"> This leads to genuine stress incontinence^Q
Fistulae	<ul style="list-style-type: none"> Leakage from fistulae (vesicovaginal)^Q or upper tract duplication with an ectopic ureter^Q.

69. Ans. c. Collection of urine in 'U' shaped curve of bulb of penis

70. Ans. b. Urodynamic study (Ref: Bailey 26/e p1315, 25/e p1320)

DETRUSOR INSTABILITY

- Phasic increases in pressure give rise to urgency and urge incontinence (detrusor instability)^Q.
- This abnormality is found in patients with neurogenic bladder dysfunction, such as in multiple sclerosis (MS) or Parkinson's disease or following a stroke or spinal injury, when it is known as detrusor hyperreflexia^Q.
- About 50% of men with bladder outflow obstruction have detrusor instability, and in about half of them the instability resolves after prostatectomy^Q.
- Idiopathic detrusor instability is common and must be distinguished from genuine stress incontinence (GSI) in women before performing bladder neck suspension procedures.

GENUINE STRESS INCONTINENCE

- This is defined as urinary leakage occurring during increased bladder pressure when this is solely due to increased abdominal pressure^Q and not to increased true detrusor pressure.
- It is caused by sphincter weakness^Q.

USES OF URODYNAMIC TESTING

- To distinguish GSI (due to sphincter weakness) from detrusor instability in women^Q
- For the classification of neurogenic bladder dysfunction^Q
- To distinguish bladder outflow obstruction from idiopathic detrusor instability in men^Q
- To investigate incontinence or other lower urinary tract symptoms^Q

71. Ans. a. Neurogenic bladder (Ref: Bailey 26/e p1315, 25/e p1319-1321)

CYSTOMETRY

- Cystometric studies are urodynamic studies in which the pressure changes in the bladder is simultaneously measured with bladder filling and during micturition^Q.
- It helps in accurate assessment of detrusor and sphincter activity especially if a neurogenic abnormality is suspected^Q.

MISCELLANEOUS

72. Ans. a. Absence of systolic detrusor contraction

Rest three options are false.

73. Ans. c. Contracture of bladder neck (Ref: Bailey 26/e p1322-1323, 25/e p1326-1327)

Pulsion diverticula: The usual cause is bladder outflow obstruction.

BLADDER DIVERTICULA

- The normal intravesical pressure during voiding is about 35–50 cm H₂O^Q; however, pressures as great as 150 cm H₂O may be reached by a hypertrophied bladder endeavouring to force urine past an obstruction^Q.
- This pressure causes the lining between the inner layer of hypertrophied muscle to protrude, forming multiple saccules.
- If one or more, but usually one, saccule is forced through the bladder wall, it becomes a diverticulum^Q.

Types**Congenital diverticula**

- As a result of a **developmental defect**^Q.
- These are **situated in the midline anterosuperiorly** and represent the **unobliterated vesical end of the urachus**^Q.

Pulsion diverticula

- The usual cause is **bladder outflow obstruction**^Q.

Pathology

- Diverticula are **lined by bladder mucosa** and the **wall is composed of fibrous tissue only**^Q

Clinical Features

- An **uninfected diverticulum** of the bladder usually causes **no symptoms**^Q.
- The patient is nearly **always male (95%)** and **over 50 years of age**^Q.
- **Symptoms** are those of associated **urinary tract obstruction, recurrent infection** and **pyelonephritis**^Q.
- **Hematuria** (due to infection, stone or tumour) is a symptom in about 30%.
- In a few patients **micturition occurs twice in rapid succession**^Q (the second act may follow a change of posture).

Diagnosis

- Diverticula are usually **discovered incidentally** on **cystoscopy** or **ultrasound**^Q.

Treatment

- **Operation** is necessary **only for the treatment of complications**^Q.
- If the **diverticulum is small** and associated **outflow obstruction** has been **dealt with by prostate resection**, there is **no reason to resect the diverticulum**^Q.
- Even a large diverticulum may not require treatment in the absence of infection or other complications.

Complications of Bladder Diverticula

- | | |
|---|---|
| <ul style="list-style-type: none"> • Recurrent urinary infection • Squamous cell metaplasia and leucoplakia | <ul style="list-style-type: none"> • Bladder stone • Hydronephrosis and hydroureter • Neoplasm |
|---|---|

74. Ans. a. CA prostate; b. Postoperative retention (Ref: Bailey 26/e p1312-1314, 25/e p1316-1317)

- **Retention of urine** can occur **after major and lengthy operations** of the **anal canal** and **perineal region**^Q. So, in these types of operations, it is usual to forestall a **catheter before or at the conclusion of the operation**.
- **Appendicitis** is **not a major operation**, so catheterization is usually not recommended.
- **Prostatic cancer** presents with **bladder outlet obstruction**. This is **relieved by catheterization**^Q.
- If the catheter will not pass, it is usually due to poor technique, lack of anesthesia, traumatization of urethra or a urethral stricture.
- If the catheter cannot be passed, suprapubic puncture and urethral instrumentation should be done.

75. Ans. a. Positive nitrite test (Ref: Smith 17/e p196)

Sensitivity and Specificity of Urinalysis in UTI		
Tests	Sensitivity (%)	Specificity (%)
Esterase	83 (67–94)	78 (64–92)
Nitrite	53 (15–82)	98 (90–100) ^Q
Esterase or Nitrite	93 (90–100)	72 (58–91)
White blood cells	73 (32–100)	81 (45–98)
Bacteria	81 (16–99)	83 (11–100)
Any above	99.8 (99–100)	70 (60–92)

76. Ans. b. 35–50 cm H₂O (Ref: Bailey 26/e p1315, 25/e p1319)

- The **normal voiding pressure** should not exceed **60 cm H₂O** in men and about **40 cm H₂O** in women, with a **flow rate** of between 20 and 25 ml/sec.

URODYNAMIC TESTING

- The principle is to **artificially simulate bladder filling and emptying** while **obtaining pressure measurements**^Q.
- The patient attends with a **full bladder** and is **allowed to void** in private to **measure the maximum urinary flow rate**^Q.
- After voiding, the **residual urine** is measured by **ultrasound**^Q.
- **Radiographic screening** may be carried out to assess **bladder neck closure** and **urinary leakage during movement or coughing** (stress incontinence) or during bouts of **phasic detrusor pressure (detrusor instability)**^Q.

URODYNAMIC TESTING

- The **normal bladder** will accept approximately **400–550 ml** when filled at room temperature at a rate of **< 50 ml/min**.
- The **pressure increase** in the **bladder** should be **< 15 cm H₂O**. In addition, phasic pressure increases should not be seen.
- The **normal voiding pressure** should not exceed **60 cm H₂O in men** and about **40 cm H₂O in women**, with a **flow rate** of between **20 and 25 ml/sec**.

77. Ans. c. Bladder outlet obstruction (Ref: Bailey 26/e p1350, 25/e p1353)

MARION'S DISEASE

- Congenital obstruction of the **posterior urethra** due to **muscular hypertrophy** and **stenosis of the bladder neck**

78. Ans. a. Muscular hypertrophy of internal sphincter of urinary bladder

79. Ans. d. Flap of the bladder wall fashioned into a tube replace lower ureter (Ref: Bailey 26/e p1289, 25/e p1292, 1307)

Boari operation	
<ul style="list-style-type: none"> • A strip of bladder wall is fashioned into a tube to bridge the gap^a between the cut ureter and the bladder. • Used for lower ureteric reconstruction • Boari flap provides the needed length to create a tension-free anastomosis between the ureter and the bladder^a 	

80. Ans. b. Lower ureteric reconstruction

81. Ans. c. Hunner's cystitis (Ref: Bailey 26/e p1328; Smith 17/e p576)

INTERSTITIAL CYSTITIS (HUNNER'S ULCER)

- Confined to women; Etiology obscure
- **Chronic pancystitis**, often with marked infiltration with lymphocytes and macrophages.
- **Ulceration of the mucosa** occurs in the **fundus of the bladder**.
- In severe cases the **bladder capacity is reduced to 30–60 ml**.
- **Characteristic linear bleeding ulcer** is caused by **splitting of the mucosa** when the bladder is distended under anaesthesia.

Clinical Features

- **First symptom** is **increased frequency**
- Pain, relieved by micturition and aggravated by jarring and over-distension of the bladder, is another characteristic symptom. Haematuria also occurs.
- In most patients **pyuria and urinary infection are absent**.

Diagnosis

- **Cystoscopy**: **Characteristic ulcer in the fundus**, but it may be absent.
- It is important to **check urinary cytology** and to **biopsy the mucosa** to **exclude underlying neoplastic disease**.

Treatment

- Treatment is difficult and unsatisfactory.
- **Hydrostatic dilatation** under anaesthesia may give relief for some months.
- **Instillation of dimethylsulphoxide** results in improvement in some patients.

82. Ans. a. Fever (Ref: Smith 17/e p206)

Prostate and Seminal Vesicles

MULTIPLE CHOICE QUESTIONS

BENIGN PROSTATIC HYPERPLASIA

- Benign prostatic hyperplasia first develops in the: (COMEDK 2011)
 - Periurethral transition zone
 - Peripheral zone
 - Central zone
 - Anterior fibromuscular stroma
- In BPH most common lobe involved is: (WBPG 2015, AIIMS June 2000)
 - Lateral
 - Posterior
 - Median
 - Anterior
- Which is the earliest symptom of benign hypertrophy of prostate? (Karnataka 94, 96)
 - Frequency
 - Hematuria
 - Incontinence
 - Strangury
- Which of the following is an absolute indication for surgery in cases of benign prostatic hyperplasia? (All India 2003)
 - Bilateral hydronephrosis
 - Nocturnal frequency
 - Recurrent urinary tract infection
 - Voiding bladder pressures > 50 cm of water
- Which of the following lasers is used for treatment of benign prostatic hyperplasia as well as urinary calculi? (All India 2003)
 - CO₂ laser
 - Excimer laser
 - Ho: YAG laser
 - Nd-YAG laser
- A 60-years old diabetic and hypertensive with second grade prostatism admitted for prostatectomy developed myocardial infarction. Treatment now would be: (All India 99)
 - Finasteride
 - Terazosin
 - Finasteride and terazosin
 - Diethyl stilbestrol
- The following statements regarding finasteride are true except: (All India 2005)
 - It is used in the medical treatment of benign prostatic hypertrophy
 - Impotence is well documented after its use
 - It blocks the conversion of dihydrotestosterone to testosterone
 - It is a 5- α reductase inhibitor
- Indication for surgery in benign prostatic hypertrophy are all except: (APPG 85)
 - Prostatism
 - Chronic retention
 - Hemorrhage
 - Enlarged prostate

- Grade I benign prostate with outflow obstruction is best treated with: (AIIMS 84)
 - Retropubic prostatectomy
 - Transurethral resection
 - Transvesicle prostatectomy
 - Androgen therapy

- Assessment of patient with prostatism include all except: (APPG 2013, DPG 2009 March)
 - Rectal examination
 - Serum prostate specific antigen
 - Pressure flow urodynamic studies
 - Transrectal ultrasound scanning

- In follow up of BPH, most important indication of surgery is: (AIIMS Nov 2010)
 - Prostate size > 75 gm
 - Single episode of UTI requiring 3 days of antibiotics
 - Cannot use medication due to hypertension
 - Bilateral hydronephrosis
- What of the following is an absolute indication for surgery in cases of benign prostatic hyperplasia? (MHSSMCET 2005, All India 2003)
 - Bilateral hydronephrosis
 - Nocturnal frequency
 - Recurrent urinary tract infection
 - Voiding bladder pressures > 50 cm of H₂O
- The drug that has the fastest onset of action in benign prostatic hyperplasia is: (COMEDK 2008)
 - Finasteride
 - Tamsulosin
 - Dutasteride
 - Flutamide
- In the management of symptomatic benign prostatic hyperplasia with finasteride the period of trial required for determining a satisfactory response is: (COMEDK 2009)
 - 1 month
 - 2 months
 - 4 months
 - 6 months

TURP AND COMPLICATIONS

- The most important use of transrectal ultrasonography (TRUS) is for: (COMEDK 2007)
 - Screening for CA prostate
 - Distinguishing prostate cancer from BPH
 - Systematic prostate biopsy in suspected prostate cancer
 - Guiding transurethral resection of prostate cancer
- The most common complication of transurethral resection of prostate (TURP): (COMEDK 2007, 2008, 2009)
 - Erectile dysfunction
 - Retrograde ejaculation
 - Urinary incontinence
 - Ringer's lactate
 - 5% dextrose

17. Delirium, mental confusion and nausea in patients who had undergone transurethral resection of prostate suggests:
 A. Hypernatremia b. Sepsis (MCI Sept 2009)
 c. Hepatic coma d. Water retention
18. Which of the following is the most common cause of delayed urinary tract obstructive symptoms after TURP?
 a. Stricture of the navicular fossa (All India 2011)
 b. Stricture of the membranous urethra
 c. Stricture of the bulb of urethra
 d. Bladder neck stenosis
19. During TURP, surgeon takes care to dissect above the verumontanum to prevent injury to:
 a. External urethral sphincter b. Urethral crest
 c. Prostatic utricle d. Trigone of bladder
20. What is the reason for following set of symptoms after prostatic surgery- restlessness, vomiting and change in sensorium?
 a. Electrolyte imbalance b. Bladder neck obstruction
 c. Acute pyelonephritis d. Ureter stenosis (AIIMS June 99)
21. TURP was done in an old patient of BHP, after which he developed altered sensorium cause is?
 a. Hypernatremia b. Hypokalemia
 c. Hyponatremia d. Hypomagnesemia (AIIMS June 2001, AIIMS June 99)
22. Commonest cause of periumbilical pain after 30 min. of TURP done under spinal anesthesia with Bupivacaine:
 a. Meteorism (AIIMS June 2000)
 b. Perforation of bladder
 c. Recovery from bupivacaine anaesthesia
 d. Mesentery artery ischemia
23. Which of the following substances is not used as an irrigant during transurethral resection of the prostate?
 a. Normal saline b. 1.5% Glycine
 c. 5% Dextrose d. Distilled Water (AIIMS Nov 2003)
24. A 70-years old patient benign prostatic hyperplasia underwent transurethral resection of prostate under spinal anaesthesia. One hour later, he developed vomiting and altered sensorium. The most probable cause is:
 a. Over dosage of spinal anesthetic agent
 b. Rupture of bladder
 c. Hyperkalemia
 d. Water intoxication (MHSSMCET 2008, AIIMS June 2001, All India 2003)
25. All of the following can be seen after transurethral resection of prostate except:
 a. Congestive cardiac failure b. Transient blindness
 c. Convulsions d. Hypernatremia (AIIMS Nov 2000)
26. T.U.R (Transurethral resection) syndrome is due to:
 a. Hyponatremia b. Hypokalemia (UPSC 95)
 c. Hypovolemia d. Hypoxia
27. Consider the following conditions:
 1. Urinary flow rate < 10 cc/second
 2. Residual volume of urine > 100 cc
 3. Serum level of prostatic specific antigen > 10 mmol/litre
 4. Trabeculated urinary bladder
 Which of the above are indications of TURP for BHP?
 a. 1, 2 and 3 b. 2, 3 and 4
 c. 1, 2 and 4 d. 1, 3 and 4
28. Which one of the following is used as an irrigation solution during transurethral resection of the prostate?
 a. 1.5% glycine b. Physiological Saline
 c. Ringer's lactate d. 5% dextrose (COMEDK 2014)

CARCINOMA PROSTATE

29. Most common site of development of carcinoma of prostate is:
 a. Peripheral zone b. Central zone
 c. Transitional zone d. Fibromuscular stroma (Recent Question 2015, DNB 2012, Orissa 2011, MHPGMCET 2002, 2001)
30. For carcinoma of the prostate, the commonest site is:
 a. Anterior zone b. Peripheral zone
 c. Central zone d. Transitional zone (AIIMS June 2001)
31. A 49-years old man suffering from carcinoma of prostate was X-rayed. He showed areas of sclerosis and collapse of T10 and T11 vertebrae in X-ray. The spread of this cancer to the above vertebrae in X-ray. The spread of this cancer to the above vertebrae was through:
 a. Sacral canal
 b. Lymphatic vessels
 c. Internal vertebral plexus of veins
 d. Superior rectal vein (AIIMS Nov 2002)
32. Mr. Chaturvedi, a 70 years old man comes to casualty with urinary retention and back pain. Which investigation should be performed?
 a. Serum acid phosphatase b. Serum calcium
 c. Serum alkaline phosphates d. Serum electrophoresis (AIIMS Nov 2000, Nov 99)
33. A 65-years old male was diagnosed with prostate cancer three years back and was treated by surgery and hormone therapy. Presently he has developed urinary symptoms and progressive backache. What is the tumor marker, which can be indicative of disease relapse?
 a. CA-125 b. Beta-HCG
 c. CEA d. PSA (AIIMS Nov 2003)
34. Specific marker for prostatic cancer is:
 a. Alkaline phosphatase b. Prostate specific antigen
 c. Acid phosphatase d. CA-125 (PGI Dec 99)
35. Screening of prostate CA commonly done by:
 a. DRE (digital rectal exam) b. USG
 c. MRI d. PSA
 e. CT scan (PGI Nov 2010, May 2005)
36. All of the following are used to detect CA prostate except:
 a. PSA b. MRI
 c. CT scan d. DSA
 e. TRUS (PGI Dec 2006)
37. A 50-years old male with positive family history of prostate cancer has come to you for a screening test. The most sensitive screening test to pickup prostate cancer is:
 a. DRE
 b. PSA
 c. DRE+ PSA
 d. Endorectal coil MRI with T1W and T2W images (All India 2007)
38. Transrectal ultrasonogram in evaluation of carcinoma prostate is most useful for:
 a. Taking guided biopsy
 b. Identifying seminal vesicle invasion
 c. Nodal sampling
 d. Measuring the extent of invasion (All India 2008)
39. In prostatic metastasis, the site most commonly involved is:
 a. Obturator nodes b. Perivesical nodes
 c. Pre-sacral nodes d. Para-aortic nodes (PGI June 99)

40. CA prostate commonly metastasizes to the vertebrae:*(All India 2001)*

- a. Because valveless communication exist with Batson's periprostatic plexus
- b. Via drainage to sacral lymph node
- c. Of direct spread
- d. None of above

41. Secondary deposits form prostatic carcinoma is commonest in:*(Recent Question 2015)*

- a. Bone
- b. Kidney
- c. Liver
- d. Brain

42. In carcinoma prostate with metastasis which is raised?*(TN 89)*

- a. ESR
- b. Alkaline phosphatase
- c. Acid phosphatase
- d. Bilirubin

43. A patient presents with complains of sciatica. On radiological examination there was sclerotic lesions on his skull. Which of the following is most likely to be elevated in this patient?*(AIIMS 2000)*

- a. CEA
- b. Prostate specific antigen
- c. Alkaline phosphatase
- d. Alpha-1 antitrypsin

44. Normal level of PSA in males is:*(DNB 2011)*

- a. < 4 ng/ml
- b. 4–10 ng/ml
- c. > 10 ng/ml
- d. PSA is not produced by normal males

45. Gleason scoring is done for:*(DNB 2009)*

- a. Prostatic cancer
- b. Lung cancer
- c. Bladder cancer
- d. Hodgkins lymphoma

46. Which of the following is true about prostate cancer screening?*(APPG 2008)*

- a. Digital screening along with PSA is additive
- b. Prostate cancer is common among young males
- c. Tumor markers are diagnostic
- d. Bleeding per rectum is earliest manifestation of disease

47. True about prostate CA is:*(DPG 2008)*

- a. Arises in the periurethral zone
- b. Extremely radio sensitive
- c. Obturator nodes are most commonly involved
- d. PSA is not used in workup

48. Gleason score: all are true except: (AIIMS May 2011, Nov 2008)

- a. Used for grading prostate cancer
- b. Scores range from 1–10
- c. Higher the score, poorer the prognosis
- d. Helps in planning management

49. Osteoblastic metastasis commonly arise from:*(JIPMER 2014, 2013, AIIMS May 2013)*

- a. Breasts
- b. Prostate
- c. Lung
- d. RCC

50. Best screening marker of prostate cancer is:*(UPPG 2009)*

- a. AFP
- b. Prostate specific antigen
- c. CA 19-20
- d. CA 125-26

51. The most important use of transrectal ultrasonography (TRUS) is for:*(COMEDK 2007)*

- a. Screening for CA prostate
- b. Distinguishing prostate cancer from BPH
- c. Systematic prostate biopsy in suspected prostate cancer
- d. Guiding transurethral resection of prostate cancer

52. Treatment for metastatic CA Prostate:*(JIPMER 2011)*

- a. GnRH analogue
- b. Estrogen therapy

- c. Radiotherapy with chemotherapy
- d. Radiotherapy

CARCINOMA PROSTATE TREATMENT**53. Which is not used in carcinoma prostate?***(PGI Dec 97)*

- a. Estrogen
- b. Progesterone
- c. Cyproterone acetate
- d. Flutamide

54. An 85-years old man underwent transurethral resection of prostate. A histological examination of his specimen showed foci of adenocarcinoma management will be:*(AIIMS Nov 2000)*

- a. Endocrine therapy
- b. Radical surgery
- c. Hormone therapy
- d. No further treatment

55. A 75-years old frail elderly man underwent TURP. The biopsy revealed adenocarcinoma. What is the next line of management?*(All India 94)*

- a. Radiotherapy
- b. Surgery followed by hormonal replacement therapy
- c. Conservative treatment
- d. Surgery followed by radiotherapy

56. Which of the following is the most troublesome source of bleeding during a radical retropubic prostatectomy?*(All India 2005)*

- a. Dorsal venous complex
- b. Inferior vesical pedicle
- c. Superior vesical pedicle
- d. Seminal vesicular artery

57. A 70-years old man with CA prostate with osteoblastic secondaries in pelvis and lumbar vertebra showed well differentiated Adeno Carcinoma prostate on needle biopsy. He is ideally treated by:

- a. Radical prostatectomy
- b. TURP
- c. Radiation
- d. Hormonal manipulation

58. Management of Carcinoma prostate in a 50-years old man revealed after TURP:*(MHSSMCET 2006)*

- a. No treatment required
- b. Hormonal therapy
- c. Bilateral subcapsular orchidectomy
- d. Radical prostatectomy

59. A 70-years old man with prostate cancer was given radiotherapy. The recurrence of the cancer is monitored biochemically by:*(AIIMS Nov 2012)*

- a. Androgens only
- b. Prostate specific antigen and carcinoembryonic antigen
- c. Prostate specific antigen only
- d. ALP and CEA

60. Treatment of metastatic prostate carcinoma is:*(JIPMER 2011)*

- a. Radiotherapy
- b. Estrogen only
- c. GnRH analogs
- d. Radiotherapy with chemotherapy

61. Which of the following drugs is useful for treatment of advanced prostate cancer?*(AIIMS November, May 2014)*

- a. Goserelin
- b. Ganirelix
- c. Cetrorelix
- d. Abarelix

62. Regarding prostatectomy which one of the statements is false: (APPG 2015)

- Water intoxication and hyponatremia can give rise to CHF
- Perineal prostatectomy (Young) is a commonly done surgical procedure
- Retrograde ejaculation occurs in about 65% of men
- Intraurethral stents are helpful in the management of men who are grossly unfit (ASA grade 4)

PROSTATITIS

63. Complication which commonly accompanies acute prostatitis: (AIIMS 87)

- Epididymitis
- Orchitis
- Seminal vesiculitis
- Sterility

64. A 60-years old male presented with fever, chills and dysuria. Patient was hospitalized in emergency for 5 days. PSA level was 7.4. Next best step in this patient: (AIIMS Nov 2013)

- Repeat PSA
- TURP
- TRUS guided biopsy
- Antibiotics and admit

INFERTILITY

65. Semen analysis of a young man who presented with primary infertility revealed low volume, fructose negative ejaculate with azoospermia. Which of the following is the most useful imaging modality to evaluate the cause of his infertility? (All India 2003)

- Colour duplex ultrasonography of the scrotum
- Transrectal ultrasonography
- Retrograde urethrography
- Spermatic venography

66. Absence of fructose in semen indicates: (PGI Dec 2008)

- Obstruction to seminal vesicles
- Obstruction at prostatic urethra
- Vas deferens obstruction
- Testicular failure

67. A 25-years old married male presents with infertility. He had undergone retroperitoneal lymph node dissection at age of 15 years for embryonal carcinoma of right testis. Semen analysis shows-quantity-0.5 ml, no. sperm, no fructose. Biopsy of testis shows normal spermatogenesis. Best treatment here would be: (All India 99)

- Artificial insemination of donor
- Penile-prosthesis
- Microtesticular aspiration and intracytoplasmic injection
- None of the above

68. A 55-years old diabetic patient presented with impotence with history of failure to get erection after papaverine intracavernous injection. Color Doppler shows no abnormality of arteries but shows mild venous run-off. Treatment of choice: (All India 99)

- Intracavernous injection of papaverine
- Penile prosthetic implants
- Vacuum constriction device
- Psychotherapy

69. The most important in assessing fertility potential is:

(PGI 80, UPSC 89)

- Sperm count
- Sperm motility
- Sperm morphology
- Quantity of ejaculated semen
- None of the above

70. Which of the following is true about obstructive azoospermia? (All India 2011)

- ↑ FSH and ↑ LH
- Normal FSH and Normal LH
- ↑ LH, Normal FSH
- ↑ FSH, Normal LH

71. In a couple for treatment of infertility from the last four years, female partner is normal. Male partner has 0.8 ml semen volume per ejaculate on two repeated samples and absent fructose, with no sperms on examination under microscope. What is the next line of management? (AIIMS Nov 2013)

- Per-rectal examination to check ejaculatory duct obstruction
- Give antioxidants
- Testicular biopsy
- Transrectal ultrasound to detect duct obstruction

PROSTATE ANATOMY AND PHYSIOLOGY

72. Corpora amylaciae is seen in:

(Kerala 94)

- Thymus
- Lymph node
- Spleen
- Prostate

73. Hot flush is not associated with:

(PGI Dec 2008)

- Medical castration
- Surgical castration
- Ketoconazole therapy
- Androgen receptor blockade
- Radical prostatectomy

74. Medical castration is effected by:

(Kerala 90)

- Deethylstilbesterol
- LHRH analogues
- Gossypol
- Hanovan

75. Complimentary operation done at the time of prostatectomy is:

(UPSC 88)

- Vasectomy
- Circumcision
- Hernia repair
- All of the above

76. Prostate calculi are usually composed of:

- Calcium oxalate
- Calcium phosphate
- Struvite
- Uric acid

EXPLANATIONS

BENIGN PROSTATIC HYPERPLASIA

1. Ans. a. Periurethral transition zone (Ref: Smith 17/e p348-355; Campbell 10/e p2570-2694; Bailey 26/e p1341-1346, 25/e p1344-1350)

BENIGN PROSTATIC HYPERPLASIA (BPH)

Incidence and Epidemiology

- BPH originates in the **transition zone**^Q, incidence is **age related**^Q
- The prevalence of BPH is 20% in 41–50 years, 50% in 51–60 years, > 90% older than 80 years.

Etiology

- Seems to be **multifactorial** and **endocrine controlled**^Q.
- The prostate is composed of **stromal** and **epithelial elements**^Q, and each, either alone or in combination, can give rise to **hyperplastic nodules**^Q and symptoms associated with BPH.

Pathology

- BPH develops in the **transition zone**. It is truly a **hyperplastic process**^Q.
- Nodular growth pattern is composed of varying amounts of **stroma** and **epithelium**.
- **Stroma** is composed of **collagen** and **smooth muscle**^Q.

- **Alpha-blocker** therapy result in **excellent responses**^Q in patients with BPH having significant component of **smooth muscle**, while those with BPH predominantly composed of **epithelium** might respond better to **5-alpha-reductase inhibitors**^Q.
- **Effects starts early** with **alpha-blockers** whereas **effect starts after 1 month** and may **take 6 months for maximum effect** with **5-alpha-reductase inhibitors**^Q.

- Patients with significant components of **collagen** in the stroma **may not respond** to **either form** of medical therapy.
- As **BPH nodules** in the transition zone enlarge, **compress** the outer zones of the prostate, resulting in the formation of a **surgical capsule** separating the transition zone from the peripheral zone, and serves as a **cleavage plane** for **open enucleation**^Q of the prostate.

Pathophysiology

- Prostatic size on DRE **correlates poorly** with symptoms because the **median lobe** is **not readily palpable**^Q.

- The **prostatic stroma**, composed of **smooth muscle** and **collagen**, is rich in **adrenergic nerve supply**. The level of autonomic stimulation thus sets a tone to the prostatic urethra. Use of **alpha-blocker therapy** **decreases this tone**, resulting in a decrease in outlet resistance^Q.
- The **irritative voiding complaints** of BPH result from the **secondary response** of bladder to the **increased outlet resistance**^Q.

- Bladder outlet obstruction leads to **detrusor muscle hypertrophy**, **hyperplasia** and **collagen deposition**^Q (collagen deposition is most likely responsible for a decrease in bladder compliance).

Symptoms

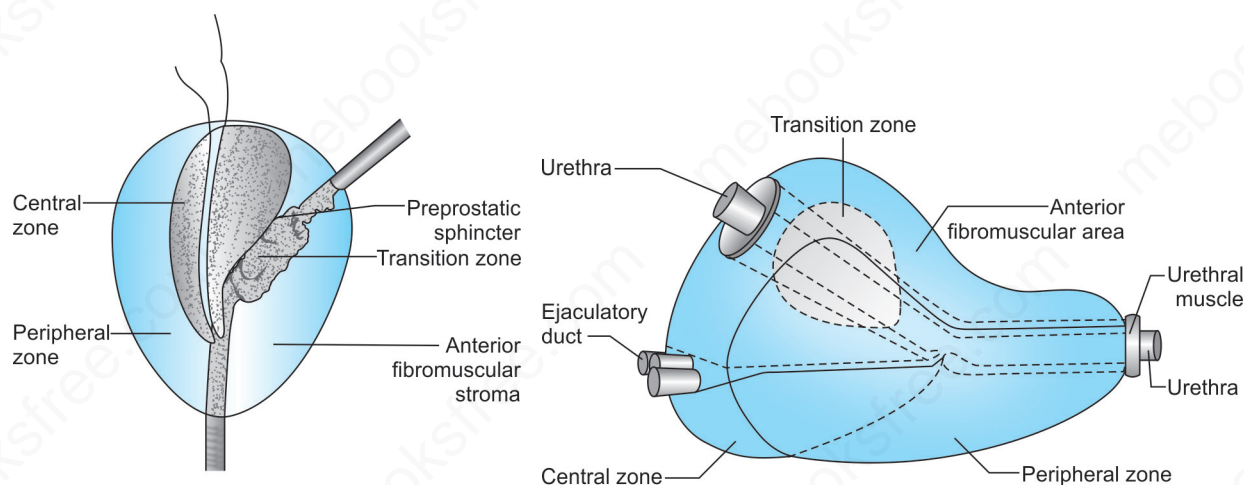
- **Obstructive symptoms** include **hesitancy**, **decreased force** and caliber of stream, sensation of incomplete bladder emptying, **double voiding** (urinating a second time within 2 hours of the previous void), **straining to urinate** and **post-void dribbling**^Q.
- **Irritative symptoms** include **frequency**, **urgency** and **nocturia** (FUN)^Q
- **IPSS symptom score**: score can range from 0–35. **Mild**: 0–7, **moderate**: 8–19, **severe**: 20–35.

Signs

- The **size and consistency** of the prostate is noted.
- BPH usually results in a **smooth, firm, elastic enlargement** of the prostate.
- **Induration** is suggestive of **cancer** and the need for further evaluation (**PSA, TRUS and biopsy**)^Q.

Imaging

- **IVP or ultrasound** is recommended only in the **presence of concomitant urinary tract disease** or **complications** from BPH (hematuria, urinary tract infection, renal insufficiency, history of stone disease).
- **Uroflowmetry**: (**Qmax >15 ml/sec** is **normal**, 10–15 ml/sec is equivocal and < 10 ml/sec is suggestive of **obstruction**)^Q
- **Cystometrograms** and **urodynamic profiles** are reserved to differentiate outflow obstruction from neurogenic bladder (**voiding pressure > 80 cm H₂O** signifies **outlet obstruction**)^Q



Anatomy of the prostate gland

2. Ans. c. Median
3. Ans. a. Frequency
4. Ans. a. Bilateral hydronephrosis, c. Recurrent urinary tract infection (Ref: Campbell 10/e p2605-2608; Bailey 26/e p1346, 25/e p1350)

Absolute indications for surgery in BPH

1. Refractory urinary retention^Q (failing at least one attempt at catheter removal)
2. Recurrent UTI^Q
3. Recurrent gross hematuria^Q
4. Bladder stones^Q (BS)
5. Renal insufficiency^Q
6. Minimal improvement on medical treatment^Q

5. Ans. c. Ho: YAG laser (Ref: Smith 17/e p354-355; Campbell 10/e p2655-2694; Bailey 26/e p1350, 25/e p1353)

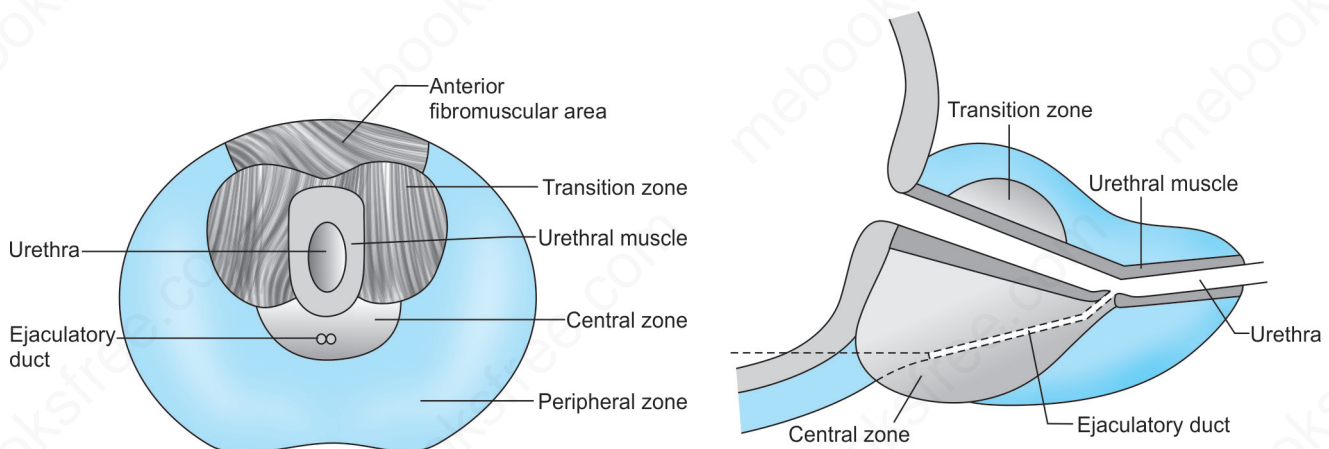
Minimally Invasive Therapy in BPH

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Laser therapy: Two main energy sources of lasers have been utilized- holmium:YAG (best)^Q, Nd:YAG. 2. Transurethral electrovaporization 3. Hyperthermia | <ol style="list-style-type: none"> 4. Transurethral needle ablation 5. High intensity focused ultrasound 6. Intraurethral stents |
|---|---|

6. Ans. b. Terazocin (Ref: Smith 17/e p352-353; Campbell 10/e p2622-2633; Bailey 26/e p1347, 25/e p1350)

MEDICAL THERAPY IN BPH

- **Alpha-blockers:** (Prazosin, terazosin, doxazosin, tamsulosin, alfuzosin)
 - Relaxes smooth muscle and decreases urethral resistance^Q.
 - Side effects: orthostatic hypotension, dizziness, tiredness, retrograde ejaculation, rhinitis and headache^Q.
 - **5-Alpha-reductase inhibitors:** (Finasteride, dutasteride, triptorelin pamoate)
 - Blocks the conversion of testosterone to dihydrotestosterone, affecting the epithelial component^Q of the prostate, resulting in a reduction in the size of gland^Q and improvement in symptoms.
- Six months of therapy are required to see the maximum effects on prostate size (20% reduction)^Q and symptomatic improvement. However, symptomatic improvement is seen only in men with enlarged prostates (> 40 cm³)^Q.
- Side effects: decreased libido, decreased ejaculate volume and impotence^Q.
 - **Combination therapy**
 - The reduction in risk associated with combination therapy (66% risk reduction is greater than that associated with doxazosin or finasteride alone^Q).
 - Patients most likely to benefit from combination therapy: whom baseline risk of progression is very high, generally patients with larger glands and higher PSA values^Q.



7. Ans. c. It blocks the conversion of dihydrotestosterone to testosterone
 8. Ans. d. Enlarged prostate
 9. Ans. b. Transurethral resection (Ref: Smith 17/e p354-355; Campbell 10/e p2605-2608; Bailey 26/e p1346-1350, 25/e p1350-1353)

TREATMENT OF BPH

- MC indication for surgery is **symptoms interfering with quality of life**^Q (bothersome symptoms and symptoms of BOO).

CONVENTIONAL SURGICAL THERAPY

- TURP (Gold standard)^Q:
 - Cystoscopic removal of strips of prostatic tissue using diathermy loop. Two techniques; NESBIT technique (preferred maver mayer technique)
 - Best irrigant fluid is 1.5% glycine**^Q (Electrolyte solutions like NaCl are **not compatible with electrocautery**, so **not used**).
 - Glycine is composed of glycolic acid and ammonium, which can cause CNS (visual) toxicity.^Q

TURIS: TUR in saline using bipolar cautery^Q

- Verumontanum** is the single most important anatomical landmark in TURP^Q.
- Verumontanum** lies immediately **proximal to external sphincter** and serve as the **distal landmark for prostate resection** to prevent injury to the external sphincter.
- Verumontanum: Distal landmark for prostate resection**^Q.
- Verumontanum: Landmark for proximal limit of external sphincter**^Q.

- Risks of TURP: Retrograde ejaculation (75%)**^Q, **impotence (5–10%)**^Q and **incontinence (<1%)**^Q.
- Complications: Bleeding, urethral stricture or bladder neck contracture**^Q, perforation of the prostate capsule with extravasation, and if severe, TUR syndrome.

TUR syndrome (Dilutional hyponatremia or water intoxication)

- TUR syndrome (Dilutional hyponatremia or water intoxication)**^Q resulting from a hypervolemic, hyponatremic state due to **absorption of the hypotonic irrigating solution**.
- Clinical Features: Nausea, vomiting, confusion, hypertension, bradycardia, and visual disturbances**^Q.
- The risk increases with **resection times > 90 minutes** or **gland size > 75 gm**.
- Treatment** includes **diuresis** (furosemide) and in **severe cases, hypertonic saline (3%)** administration.

Late Complications of TURP

- Bladder neck stenosis (4%) > Urethral stricture (3.6%)**
- Bladder neck stenosis** is seen more often with **small (< 30 gm) fibrotic prostates**.

- Transurethral incision of the prostate (TUIP):**
 - For **posterior commissure hyperplasia** (elevated bladder neck), involves **two incisions** using the Collins knife at the **5- and 7-o'clock** positions.
 - The **incisions** are started **just distal to the ureteral orifices** and are **extended outward to the verumontanum**.

- TUIP lowers the incidence of bladder neck contracture when compared to TURP, so TUIP should be strongly considered in patients with smaller gland in place of TURP.
- TUIP is used for smaller (20 gm) prostate, young patients.
- Decreased incidence of retrograde ejaculation as compared to TURP.

- **Open simple prostatectomy:** Glands > 75 gm, concomitant bladder diverticulum or a bladder stone or if dorsal lithotomy positioning is not possible.
 - **Suprapubic prostatectomy:** Performed transvesically (Frayer's)^Q and operation of choice in dealing with concomitant bladder pathology (Bladder stones or diverticulum)^Q.
 - **Retropubic prostatectomy (Millin's)^Q:** Transverse incision is made in surgical capsule of prostate and enucleation is done.
 - **Perineal prostatectomy (Youngs)^Q:** Abandoned now

- **Carcinoma prostate** originates in peripheral zone of prostate, so prostatectomy for BPH confers no protection for subsequent cancer^Q.

10. Ans. d. Transrectal ultrasound scanning (Ref: Bailey 25/e p1349, 24/e p1375; Smith Urology 17/e p208-210)

In prostatitis, DRE examination reveals tender, enlarged glands that are irregular and warm. PSA levels are often elevated. TRUS is only indicated in patients who do not respond to conventional therapy.

LET US CONSIDER EVERY OPTION

- In prostatitis, DRE examination reveals tender, enlarged glands that are irregular and warm^Q.
- PSA levels are often elevated^Q.
- TRUS is only indicated in patients who do not respond to conventional therapy^Q.

11. Ans. d. Bilateral hydronephrosis

12. Ans. a. Bilateral hydroureteronephrosis, c. Recurrent urinary tract infection

13. Ans. b. Tamsulosin

14. Ans. d. 6 months

TURP AND COMPLICATIONS

15. Ans. c. Systematic prostate biopsy in suspected prostate cancer (Ref: Rumack's Diagnostic Ultrasound 3/e p411)

Uses of TRUS in CA prostate

- To guide biopsy
- To guide therapy

16. Ans. b. Retrograde ejaculation (Ref: Smith 17/e p354-355; Campbell 10/e p2605-2608; Bailey 26/e p1346-1350, 25/e p1350-1353)

17. Ans. d. Water retention

18. Ans. d. Bladder neck stenosis

19. Ans. a. External urethral sphincter

- **Verumontanum** is the single most important anatomical landmark in TURP^Q.
- **Verumontanum** lies immediately proximal to external sphincter and serve as the distal landmark for prostate resection to prevent injury to the external sphincter.
- **Verumontanum:** Distal landmark for prostate resection^Q.
- **Verumontanum:** Landmark for proximal limit of external sphincter^Q.

20. Ans. a. Electrolyte imbalance

21. Ans. c. Hyponatremia

22. Ans. b. Perforation of bladder (Ref: Bailey 26/e p1349, 25/e p1352)

COMPLICATIONS OF TURP

- **Perforation of the bladder** or the prostatic capsule can occur at the time of transurethral surgery.
- This usually occurs from a combination of inexperience in association with a large prostate or heavy blood loss.
- A large perforation with marked extravasation may require the insertion of a small suprapubic drain.
- If not detected, it may present postoperatively after the effect of spinal anesthesia, as suprapubic pain.

23. Ans. a. Normal saline

24. Ans. d. Water intoxication

25. Ans. d. Hyponatremia

26. Ans. a. Hyponatremia

27. Ans. c. 1, 2 and 4

28. Ans. a. 1.5% glycine

CARCINOMA PROSTATE

29. Ans. a. Peripheral zone (Ref: Smith 17/e p355-169; Campbell 10/e p2715-2740; Bailey 26/e p1351-1356, 25/e p1354-1357)

PROSTATE CANCER

- MC cancer of males, MC cause of bone secondaries^Q
- African-American men have highest incidence, less common in Asians^Q
- Best screening protocol for CA prostate: PSA + DRE^Q

Risk Factors

- Advancing age and increased fat intake^Q increase the risk
- Lycopene, Vitamin A and E and selenium decrease the risk^Q
- MC genetic alteration in CA prostate is hypermethylation of glutathione transferase (GSTP-1)^Q gene promoter located on chromosome 11^Q.

Pathology

- MC type is adenocarcinoma^Q > TCC
- Prostatic adenocarcinoma are often multifocal and heterogenous^Q
- It is often accompanied by premalignant lesion PIN (prostatic intraepithelial neoplasia)

- Neoplastic glands are smaller, more crowded and lack branching and papillary infoldings.
- Diagnosis of CA prostate based on absence of basal cell layer^Q.

- Basal cell layer is present in normal glands, BPH glands and the precursor lesions of CA prostate^Q.
- Site: Peripheral zone- 75%^Q, Transition zone- 15%, Central zone- 10%

Spread

- Spread occurs by direct local invasion and through hematogenous and lymphatics
- Local invasion most commonly involves seminal vesicles and base of bladder^Q

- Hematogenous spread occurs mostly to bone (axial skeleton is MC site with lumbar spine^Q being most frequently implicated) forming osteoblastic secondaries^Q
- Visceral metastasis most commonly involve lungs^Q > liver > adrenal glands
- Lymphatic metastasis are most often identified in obturator nodes^Q

- CNS involvement is usually a result of direct extension from skull metastasis^Q

Clinical Features

- Most patients with early-stage CA prostate are asymptomatic, being peripheral^Q.
- Presence of symptoms suggest locally advanced or metastatic disease
- DRE: Hard, irregular, nodular prostate with median sulcus obliteration^Q

Laboratory Findings

- Azotemia (bilateral ureteral obstruction), anemia in metastatic disease, raised ALP in bony metastasis
- PSA velocity >0.75 ng/ml/yr indicates carcinoma^Q

Prostate Biopsy

- TRUS guided biopsy is done in patients with abnormal DRE or elevated PSA or both^Q.
- Differentiation of tumor is graded by Gleason score^Q. A sum of 7 or more suggests an aggressive cancer.

Imaging

- TRUS is used for staging, most lesions are hypoechoic^Q.

Endorectal MRI in CA Prostate

- Most optimal imaging to appreciate the prostate anatomy^Q
- Prostate cancer is associated with lower levels of citrate and higher levels of choline and creatine^Q compared to BPH or normal tissues.
- The combined information provided by MRI and MR spectroscopy (for detection of citrate) may allow for a more accurate assessment of cancer location and stage^Q

Axial imaging in CA Prostate

- CT scan is mainly used to detect LN metastasis
- Intravenous administration of superparamagnetic nanoparticles, which gain access to lymph nodes by means of interstitial-lymphatic fluid transport, at the time of high resolution MRI, appears to improve visualization of small nodal metastasis^Q

Bone Scan

- Patients with PSA ≥ 15 ng/ml or greater, locally advanced disease (T3b, T4) are at higher risk for bone metastasis, and should be considered for bone scan^Q.

30. Ans. b. Peripheral zone
 31. Ans. c. Internal vertebral plexus of veins
 32. Ans. a. Serum acid phosphatase (Ref: Smith 17/e p360-361; Campbell 10/e p2748-2762; Bailey 26/e p1353, 25/e p1344)

TUMOR MARKERS OF CA PROSTATE (APART FROM PSA)

- Prostatic acid phosphatase:
 - PAP activity is **1000 fold greater** in the **prostate**^Q than any other tissue
 - PAP is **not prostate specific**^Q and detectable levels are noted after prostatectomy
 - Increased in renal, liver and bony malignancies**^Q
- Alkaline phosphatase:
 - Raised in liver involvement or bony metastasis**^Q
- Alpha-methyl co-A racemase^Q
- Hepsin^Q
- DD3^Q

33. Ans. d. PSA (Ref: Smith 17/e p360-361; Campbell 10/e p2764-2765; Bailey 25/e p1344)

PROSTATE SPECIFIC ANTIGEN (PSA)

- It is a **glycoprotein**, serine protease^Q.
- Free: 10–40%**^Q; **Complexed to antiprotease: 60–90%**^Q
- Formed in prostate**^Q, secreted in seminal fluid
- Causes **liquefaction of seminal coagulum**^Q
 - Normal value: ≤ 4 ng/ml**^Q (in > 50 years); Value > 20 ng/ml is **diagnostic of CA prostate**^Q
 - PSA is the single test with **highest positive predictive value** for CA prostate^Q.
 - PSA is **prostate specific, not the cancer specific**^Q
 - Level of PSA is directly related to tumor burden**^Q
- Its use without DRE is not recommended as 25% of men with CA prostate have PSA levels <4 ng/ml.
- Best use of PSA is monitoring after radical prostatectomy**^Q

PSA related Investigations		
PSA Density	PSA Velocity	Free PSA
<ul style="list-style-type: none"> PSA/Prostate volume If ≥ 0.15, biopsy^Q recommended 	<ul style="list-style-type: none"> Rate of change of PSA per year^Q ≥ 0.75 ng/ml/year indicates carcinoma^Q Assessment at every 18 months 	<ul style="list-style-type: none"> Free PSA (in %) appears to be most useful in distinguishing between those with and without CA prostate when total PSA levels fall in the range of 4–10 ng/ml^Q

Prostate Specific Antigen (PSA)	
Increased PSA	Decreased PSA
<ul style="list-style-type: none"> CA prostate^Q, BPH^Q Acute prostatitis, Chronic prostatitis^Q Prostatic abscess^Q Catheterization, Cystoscopy^Q Prostatic biopsy^Q (TRUS) DRE^Q, Sexual intercourse 	<ul style="list-style-type: none"> Castration^Q Anti-androgen therapy^Q Radiotherapy or chemotherapy^Q for CA prostate Radical prostatectomy^Q

34. Ans. b. Prostate specific antigen
 35. Ans. a. DRE, d. PSA
 36. Ans. b. MRI, c. CT scan, d. DSA
 37. Ans. c. DRE+ PSA
 38. Ans. a. Taking guided biopsy
 39. Ans. a. Obturator nodes
 40. Ans. a. Because valveless communication exist with Batson's periprostatic plexus

Most Common Lymph Nodes Involved	
CA Penis	Inguinal LN ^Q
CA Testis	On right: Inter-aortocaval ^Q LN On left: Paraaortic ^Q LN
CA Bladder	Obturator ^Q LN
CA Prostate	Obturator ^Q LN

41. Ans. a. Bone
 42. Ans. c. Acid phosphatase
 43. Ans. b. Prostate specific antigen
 44. Ans. a. < 4 ng/ml
 45. Ans. a. Prostate cancer
 46. Ans. a. Digital screening along with PSA is additive
 47. Ans. c. Obturator nodes are most commonly involved

48. Ans. b. Scores range from 1–10 (Ref: Smith 17/e p357-358; Bailey 26/e p132)

Gleason score ranges from 2 to 10.

GLEASON SCORE AND GRADING SYSTEM

- Gleason score is the MC used histological grading system for prostate cancer^Q.
- The two most predominant histological patterns of the prostate cancer are assigned a Gleason grade ranging from 1–5^Q.
 - Primary grade is assigned to the pattern of cancer that is most commonly observed in the histological slides of the specimen^Q.
 - Secondary grade is assigned to the second most commonly observed pattern in the specimen.
 - Gleason score is the sum of the two grades. Thus it is also known as Gleason sum^Q.
- If the entire specimen has only one pattern present, then both the primary and secondary grades are reported as the same grade.
 - The Gleason grade ranges from 1 to 5, with 5 having the worst prognosis^Q.
 - The Gleason score ranges from 2 to 10^Q.
- The Gleason score is used to help evaluate the prognosis of men with prostate cancer. Together with other parameters, the Gleason score is incorporated into a strategy of prostate cancer staging which predicts prognosis and help guide therapy.
 - A point of importance is that the primary Gleason grade is most important^Q with respect to placing patients in prognostic groups.
 - For example in patients with a Gleason score 7, a Gleason 4+3 is a more aggressive cancer than a Gleason 3+4.

49. Ans. b. Prostate (Ref: Harrison 18/e p820-821; Devita 9/e p2512-2513; CSDT 12th/1202)

Osteoblastic metastasis commonly arises from carcinoma prostate.

- MC site of primary for bone metastasis: CA Breast^Q
- MC cause of osteoblastic secondaries in males: CA Prostate^Q
- MC cause of osteoblastic secondaries in females: CA Breast^Q
- MC tumor metastasize to bone in females: CA Breast^Q

50. Ans. b. Prostate specific antigen

51. Ans. c. Systematic prostate biopsy in suspected prostate cancer

52. Ans. a. GnRH analogue (Ref: Smith 17/e p367-369)

- In metastatic CA prostate, Androgen ablation (Hormone therapy) is first line of treatment: Orchiectomy + Flutamide or LHRH + Flutamide^Q.
- Leuprolide and goserelin are GnRH analogs, which are used primarily for the treatment of hormone-responsive prostate cancer^Q.

CARCINOMA PROSTATE TREATMENT

53. Ans. b. Progesterone (Ref: Smith 17/e p366-369; Campbell 10/e p2767-2770, p2883-2916; Bailey 26/e p1352-1356, 25/e p1357-1359)

7 th AJCC (2010) TNM Staging for CA Prostate	
T: Primary tumor	N: Regional lymph nodes
Tis: Carcinoma in situ (PIN)	N0: No regional LN metastasis
T1a: ≤5% of tissue in resection for benign disease has cancer, normal DRE T1b: >5% of tissue in resection for benign disease has cancer, normal DRE T1c: Tumor identified by needle biopsy (e.g. because of elevated PSA)	N1: Metastasis in a regional LNs (obturator, internal iliac, external iliac, presacral LNs)
	M: Distant metastases
T2a: Tumor involves one half of one lobe but not both lobes T2b: Tumor involves more than one half of one lobe or less T2c: Tumor involves both lobes	M1a: Distant metastasis in non-regional lymph nodes M1b: Distant metastasis to bone M1c: Distant metastasis to other sites
T3a: Extracapsular extension on one or both sides T3b: Seminal vesicle involvement	
T4: Tumor directly extends into bladder neck, sphincter, rectum, levator muscles, or into pelvic sidewall	

Treatment of CA Prostate	
T1a	<ul style="list-style-type: none"> Incidentally found tumors at TURP, by definition low volume ($\leq 5\%$), usually well differentiated associated with very slow growth rate^a. Managed by watchful waiting (Regular follow up with DRE and PSA)^a
T1b, T1c and T2	<ul style="list-style-type: none"> Management depends on patient's age, life expectancy, performance status and patient's preference. In younger, fitter men (< 70 years): Radical prostatectomy^a or radiotherapy^a, if surgery is contraindicated Elderly (> 70 years) with life expectancy < 10 years: Watchful waiting^a (Progress rate is very slow, 10% at 10 years)
Advanced disease (T3, T4 or any metastasis)	<ul style="list-style-type: none"> Palliative treatment, androgen ablation or palliative radiotherapy Androgen ablation (Hormone therapy) is first line of treatment: Orchiectomy + Flutamide or LHRH + Flutamide^a Palliative radiotherapy^a

New Drugs in metastatic, castration resistant CA Prostate

- Cabazitaxel and Sipuleucel-T^a**

54. Ans. d. No further treatment
55. Ans. c. Conservative treatment
56. Ans. a. Dorsal venous complex
57. Ans. d. Hormonal manipulation
58. Ans. d. Radical prostatectomy
59. Ans. c. Prostate specific antigen only (Ref: Smith 17/e p355-169; Campbell 10/e p2715-2740; Bailey 25/e p1354-1357; Harrison 18/e p801)

Cancer control (in CA Prostate) after radiotherapy has been defined by various criterias including: (Ref: Harrison 18/e p801)

- A decline in PSA to less than 0.5 or 1 ng/ml
- "Non-rising" PSA values
- Negative biopsy of the prostate 2 years after completion of the treatment

The current standard definition of biochemical failure (the Phoenix definition) is a rise in PSA by ≥ 2 ng/ml higher than the lowest PSA achieved

60. Ans. c. GnRH analogs
61. Ans. a. Goserelin (Ref: Katzung 12/e p972; Goodman and Gilman 12/e p1763-1764; Smith 17/e p366-369; Campbell 10/e p2767-2770, 2883-2916; Bailey 26/e p1352-1356, 25/e p1357-1359)

Goserelin is useful for the treatment of advanced prostate cancer.

- "Localized prostate cancer is frequently curable with surgery or radiation therapy. However, when distant metastases are present, hormone therapy is the primary treatment. Standard approaches either reduce the concentration of endogenous androgens or inhibit their effects. Androgen deprivation therapy (ADT) is the standard first-line treatment. ADT is accomplished via surgical castration (bilateral orchiectomy) or medical castration (using GnRH agonists or antagonists). Leuprolide and goserelin have been compared with orchiectomy in randomized trials and found equivalent in overall survival, progression-related outcomes and time to treatment failure. The theoretical advantage is that the GnRH agonist (Leuprolide and Goserelin) will deplete testicular androgens, while the anti-androgen component will complete at the receptor site with residual androgens made by the adrenal glands. GnRH antagonists (Abarelix, degarelix) have been developed to suppress testosterone while avoiding the flare phenomenon of GnRH agonists. Other than avoidance of the initial flare, GnRH antagonist therapy offers no apparent advantage compared with GnRH agonists." - Goodman and Gilman 12/e pp1763-1764

- "The treatment of choice for patients with advanced prostate cancer is elimination of testosterone production by the testes through either surgical or chemical castration. Bilateral orchiectomy or estrogen therapy in the form of diethylstilbestrol was previously used as first-line therapy. Presently, the use of GnRH agonists-including leuprolide and goserelin, alone or in combination with anti-androgen (e.g. e.g. flutamide, bicalutamide or nilutamide) is the preferred approach." - Katzung 12/e p972

62. Ans. b. Perineal prostatectomy (Young) is a commonly done surgical procedure

PROSTATITIS

63. Ans. c. Seminal vesiculitis (Ref: Smith 17/e p208-209; Campbell 10/e p333-337; Bailey 26/e p1357, 25/e p1359)

ACUTE BACTERIAL PROSTATITIS

- Acute inflammation of prostate associated with UTI
- Caused by **ascending urethral infection** or **reflux of infected urine^Q** into prostatic ducts
- MC organism: *E. coli*^Q
- Patients present with sudden onset **high grade fever** with **chills** and **rigors**, severe **irritative symptoms** and **enlarged, tender and boggy prostate^Q**
- **Catheterization** and **prostatic massage** is **contraindicated^Q**
- MC used antibiotics are: **TMP-SMX** and **Ciprofloxacin** (Both are having better **concentration in prostatic tissue**)^Q
- Around **4-6 weeks^Q** of antibiotic therapy is used to avert chronic bacterial prostatitis.

Chronic Bacterial Prostatitis (Ref: Smith 17/e p209; Campbell 10/e p333-337; Bailey 26/e p1357, 25/e p1360)

- Due to **persistent bacterial infection^Q** of prostate
- **Insidious** in onset, characterized by **relapsing or recurrent UTI^Q** caused by persistence of pathogen in prostatic fluid despite of antibiotic therapy
- **Diagnosis** is made by **microscopic examination** and **culture** of prostatic expressate and culture of urine obtained before and after prostatic massage^Q.
- **Treated by chronic antibiotic suppression (3–4 months)^Q**

Prostatic Abscess (Ref: Smith 17/e p210; Bailey 26/e p1357, 25/e p1359)

- Most cases result from **complications of acute bacterial prostatitis^Q**
- **Fluctuation** is a **very late sign^Q**
- **Predisposing factors:** **Diabetes**, **renal insufficiency**, **immunosuppression**, **urethral instrumentation**, **chronic indwelling catheter^Q**
- **Diagnosis:** **TRUS** or **pelvic CT scan** is crucial for diagnosis and treatment
- Treated by **transurethral drainage** and **antibiotics^Q**

64. Ans. d. Antibiotics and admit (Ref: Smith 17/e p208-209; Campbell 10/e p333-337; Bailey 25/e p1359)

A 60 years old male presented with fever, chills and dysuria. Patient was hospitalized in emergency for 5 days. PSA level was 7.4. This patient is most probably suffering from acute bacterial prostatitis and treated by antibiotics.

INFERTILITY

65. Ans. b. Transrectal ultrasonography (Ref: Smith 17/e p691-699)

- **Sperms** are produced in **seminiferous tubules** and then **stored** and **matured within the epididymis^Q**.
- **Vas deferens** carries the **sperms** from epididymis **to the urethra** where they open by separate openings into prostatic urethra^Q.
- **Just before opening**, each vas deferens is **joined by ducts of seminal vesicles^Q**.
- **Vas deferens** and **seminal vesicle ducts** join to **form the ejaculatory duct^Q**.

SEMEN ANALYSIS

- **Fresh semen** is a coagulum that **liquefies 15-30 minutes** after ejaculation^Q.
- **Ejaculate volume** should be at least **1.5 mL^Q**, as smaller volumes may not sufficiently buffer against vaginal acidity.
- **Sperm concentration** should be **> 20 million sperm/mL^Q**.
- **Sperm motility** and **sperm cytology** or **morphology^Q** is another measure of semen quality.
- **Sperm morphology** is a **sensitive indicator of overall testicular health^Q**, because these characteristics are determined during spermatogenesis.

Abnormalities

- **Low ejaculate volume** may indicate:
 - **Retrograde ejaculation^Q**
 - **Incomplete collection^Q**
 - **Ejaculatory duct obstruction^Q**
 - **Androgen deficiency^Q**
- **Azoospermia:**
 - **Testicular failure^Q**
 - **Obstruction of vas deferens^Q**
- **Absence of fructose:**
 - **Seminal vesicle agenesis or obstruction^Q**

Semen Analysis-Minimal Standards of Adequacy	
Ejaculate volume:	1.5–5.5 mL ^Q
Sperm concentration:	>20 × 10 ⁶ sperm/mL ^Q
Motility:	>50% ^Q
Forward progression:	2 (scale 1–4) ^Q
Morphology:	>30% WHO normal forms (> 4% Kruger normal forms)
No agglutination (clumping), white cells, or increased viscosity ^Q .	

Transrectal Ultrasound	
<ul style="list-style-type: none"> High-frequency (5–7) MHz transrectal ultrasound (TRUS) offers superb imaging of the prostate, seminal vesicles, and ejaculatory ducts^Q. Due to both accuracy and convenience, TRUS has replaced surgical vasography in the diagnosis of obstructive lesions that cause infertility^Q. 	

66. Ans. a. Obstruction to seminal vesicles (Ref: Smith 17/e p691-699)

- Absence of fructose in the semen indicates **seminal vesicle agenesis or obstruction of its duct or the ejaculatory duct**^Q.

67. Ans. c. Microtesticular aspiration and intracytoplasmic injection (Ref: Smith 17/e p710-711)

SPERM ASPIRATION

- Sperm aspiration techniques are indicated for men in whom the **transport of sperm is not possible** because the **ductal system is absent or surgically unreconstructable**^Q.
- An example of this is **vasal agenesis**. **Acquired forms of obstruction** may also exist, the most common of which is **failed vasectomy reversal**^Q.
- Aspiration procedures** can involve **microsurgery** to **collect sperm** from the sperm reservoirs within the genital tract^Q.
- At present, **sperm** are routinely **aspirated from the vas deferens, epididymis, or testicle**^Q.

- In cases of **sperm aspiration** from the **testicle and epididymis**, **IVF along with intracytoplasmic sperm injection (ICSI)** is required^Q.
- An **obvious prerequisite** for these procedures is **ongoing sperm production**^Q.
- Although **evaluated indirectly** by **hormone levels and testis volume**, the **most direct way to verify sperm production** is with a **testis biopsy**^Q.

Vasal Aspiration	Epididymal Aspiration	Testis Sperm Retrieval
<ul style="list-style-type: none"> Vasal aspiration provides the most mature or fertilizable sperm^Q, as they have already passed through the epididymis^Q, where sperm maturation is completed. 	<ul style="list-style-type: none"> Epididymal sperm aspiration is performed when the vas is not present or is scarred and unusable^Q. Epididymal sperm are not as mature as vasal sperm^Q; as a consequence, epididymal sperm require ICSI to fertilize the egg^Q. 	<ul style="list-style-type: none"> The most recently developed aspiration technique^Q Indicated for patients in whom there is an unreconstructable blockage in the epididymis, or in cases of severe testis failure^Q, in which so few sperm are produced that they cannot reach the ejaculate.

68. Ans. c. Vacuum constriction device (Ref: Campbell 10/e p746)

VACUUM ERECTION DEVICE THERAPY

- In **patients who do not respond to or decline oral or local vasoactive pharmacotherapeutic options**^Q, vacuum erection device therapy may be alternatively explored.

- The **principle of vacuum erection device therapy** is to **mechanically create negative pressure surrounding the penis** in order to **engorge it with blood** and then **restrain blood egress from the organ to maintain the erection-like effect**^Q.

- Efficacy rates** in achieving **satisfactory erections** of 67–90%, but **satisfaction rates** with the device are lower, ranging from 34–68%.
- The device is **more acceptable to older men in a steady relationship** compared with young, single men.

- Success is limited** in patients with **severe vascular abnormalities** such as **proximal venous leakage** or **arterial insufficiency or fibrosis secondary to priapism or prosthesis infection**^Q.

- Further, it may offer a means to **preserve the elasticity of penile tissues** after **priapism** or **penile prosthesis explantation** or after **surgical correction of Peyronie's disease**^Q.
- It has been suggested to **facilitate erection recovery after treatments for prostate cancer**^Q.

69. Ans. b. Sperm motility

70. Ans. b. Normal FSH and normal LH (Ref: Shaw's 13/e p203; Oxford textbook of Medicine 4/e p283)

Obstructive azoospermia is associated with normal levels of FSH and LH.

Azoospermia		
Obstructive Azoospermia	Hypogonadotrophic Azoospermia	Hypergonadotrophic Azoospermia
Azoospermia due to obstruction: <ul style="list-style-type: none"> • Normal FSH and LH^Q • Normal testosterone^Q • Testicular volume is usually normal^Q 	Azoospermia due to hypothalamic or pituitary failure: <ul style="list-style-type: none"> • Low FSH and LH^Q • Low testosterone^Q • Testicular volume is usually reduced^Q 	Azoospermia due to testicular (end organ) failure: <ul style="list-style-type: none"> • Persistently elevated FSH^Q • Testicular volume is usually reduced^Q

71. Ans. d. Transrectal ultrasound to detect duct obstruction (Ref: Smith 17/e p691-699)

Absent fructose with no sperms in ejaculate is suggestive of obstruction of vas deferens with seminal vesicle agenesis or obstruction. Next line of management in this patient would be transrectal ultrasound to detect duct obstruction.

"High-frequency (5-7) mHz transrectal ultrasound (TRUS) offers superb imaging of the prostate, seminal vesicles, and ejaculatory ducts^Q. Due to both accuracy and convenience, TRUS has replaced surgical vasography in the diagnosis of obstructive lesions that cause infertility^Q."

PROSTATE ANATOMY AND PHYSIOLOGY

72. Ans. d. Prostate (Ref: Smith 17/e p273-274; Campbell 10/e p2527-2528; Bailey 25/e p1353)

73. Ans. e. Radical prostatectomy (Ref: Bailey 25/e p1358-1359; Campbell 10/e p2942-2943)

HOT FLASHES

- Hot flashes (also called hot flushes, vasomotor symptoms) have been recognized as a side effect of androgen ablation (medical or surgical)^Q
- Described as a subjective feeling of warmth in the upper torso and head followed by objective perspiration
- Are among the most common side effects of androgen ablation^Q, affecting between 50% and 80% of patients
- Treatment of hot flashes should be reserved for those who find them bothersome^Q.
- Drugs used for treatment: DES, oral progestogens, cyproterone acetate, clonidine, sertraline, venlafaxine^Q

74. Ans. a. Diethylstilbestrol, b. LHRH analogues (Ref: Smith 17/e p368)

Androgen Ablation Therapy for Prostate Cancer	
Level	Agent
Pituitary	<ul style="list-style-type: none"> • Diethylstilbestrol^Q • Goserelin^Q • Leuprolide^Q
Adrenal	<ul style="list-style-type: none"> • Ketoconazole^Q • Aminoglutethimide^Q
Testicle	<ul style="list-style-type: none"> • Orchiectomy^Q
Prostate cell	<ul style="list-style-type: none"> • Bicalutamide^Q • Flutamide^Q • Nilutamide^Q

75. Ans. None

76. Ans. b. Calcium phosphate (Ref: Smith 17/e p273-274; Campbell 10/e p2527-2528; Bailey 25/e p1350-1351, 25/e p1353)

PROSTATIC CALCULI

- Thought to represent calcified corpora amylacea^Q, which is composed of calcium phosphate^Q
- Usually phosphate, seen on TRUS in nearly all elderly males^Q
- Lie at the periphery of transition zone
- Usually asymptomatic due to peripheral location, tend to occur in clusters^Q
- Calculi do not predispose to infections^Q
- But if infections occurs in the presence of calculi, it is almost impossible to eradicate^Q as the calculi may get infected and serve as a source of bacterial persistence and recurrent UTI.

Urethra and Penis

MULTIPLE CHOICE QUESTIONS

HYPOSPADIAS

1. **True about hypospadias:** (JIPMER 2011)
 - a. Associated with chordee
 - b. 50% associated with undescended testis
 - c. Due to failure of fusion of posterior wall of urethra
 - d. Circumcision done immediately
2. **True about hypospadias:** (PGI May 2010)
 - a. Defect seen in ventral penis
 - b. Always associated with chordee
 - c. Associated with hooded prepuce
 - d. Circumcision should be avoided
3. **Circumcision is contraindicated in:** (NEET 2013; WBPG 2012; GB Pant 2010)
 - a. Paraphimosis
 - b. Meatal stenosis
 - c. Hypospadias
 - d. Phimosis
4. **True about hypospadias is all except:** (MHPGMCET 2003)
 - a. Sex determination is not possible
 - b. Prepuce is hooded
 - c. Incidence is 1 in 3000 male births
 - d. May not require surgical treatment
5. **Most common congenital anomaly of urethra:** (MHSSMCET 2008)
 - a. Hypospadias
 - b. Epispadias
 - c. Meatal stenosis
 - d. PU valve
6. **Commonest hypospadias is:** (DNB 2011, 2001, AIIMS Dec 95)
 - a. Penile
 - b. Glandular
 - c. Scrotal
 - d. A or C
7. **All are true about hypospadias, except:** (AIIMS June 93)
 - a. Circumcision in infancy is contraindicated
 - b. Avoid surgery till puberty
 - c. No treatment required in glandular variety
 - d. If associated chordee is present, 2 stage operation is done
8. **The best time for surgery of hypospadias is:** (All India 2003)
 - a. 1–4 months of age
 - b. 6–10 months of age
 - c. 12–18 months of age
 - d. 2–4 years of age
9. **Features of hypospadias are all except:** (WBPG 2014, All India 98)
 - a. Chordee
 - b. Hooded prepuce
 - c. No-treatment required with glandular variety
 - d. Cryptorchidism
10. **In hypospadias all are seen except:** (BIHAR 2014; PGI Dec 99)
 - a. Hooded penis
 - b. Dorsal chordee
 - c. Spatulated glans
 - d. Meatal stenosis
11. **True about hypospadias is all except:** (PGI June 2001)
 - a. Bifid scrotum
 - b. Metal stenosis
 - c. Mental retardation
 - d. Spatulated glans
12. **True about hypospadias is:** (PGI June 2003)
 - a. Metal stenosis
 - b. Dorsal hood
 - c. Proximal opening of meatus
 - d. Lateral curvature
 - e. Urethral stricture common
13. **Which is not true of hypospadias?** (AIIMS 92)
 - a. Chordee is reversed after 5 years
 - b. Glandular type needs no treatment
 - c. Circumcision should not be done
 - d. Surgical correction has good results in infancy
14. **Penis is curved in downward direction in all types of hypospadias except:** (PGI 80, AIIMS 80)
 - a. Glandular
 - b. Coronal
 - c. Penile
 - d. Perineal
15. **In severe hypospadias the possibility of an intersex problem is settled by:** (AIIMS 81, AMU 87)
 - a. Careful inspection of genitals
 - b. Biopsy for gonadal tissue
 - c. Karyotyping
 - d. Hormone assay
16. **All of the following are seen in hypospadias except:** (All India 96)
 - a. Ectopia vesicae
 - b. Hooded prepuce
 - c. Chordee
 - d. Infertility
17. **Which of the following urethral anomaly is the most common?** (TN 99)
 - a. Hypospadias
 - b. Pin hole meatus
 - c. Epispadias
 - d. Stricture urethra
18. **Which of the following is true regarding hypospadias?** (APPG 2015)
 - a. It is attributed to failure of complete urethral tubularisation in the fetus
 - b. Urethral opening is most commonly in the perineum
 - c. Urethra opens proximally and dorsally
 - d. It is seen in 1 in 1500 boys

19. Read the following statements and choose the appropriate answer -

Statement A (Assertion) - Ritual circumcision is contraindicated in infants with hypospadias

Statement R (Reasoning) - In hypospadias, foreskin is deficient dorsally and there is a variable degree of chordee (APPG 2016) Place it after question no. 18 in chapter no 24 urethra and penis.

- Statements A & R are both Correct but R is not the Reasoning for A
 - Statement A is wrong but Statement R is Correct
 - Statements A & R are both Correct and R is the reasoning for A
 - Statement A is Correct but Statement R is wrong
20. Which of the following developmental defects of the urogenital sinuses never occurs in the female? (APPG 2016)
- All these defects can occur
 - Hypospadias
 - Ectopia vesicae
 - Epispadias

EPISPADIAS

21. Epispadias is associated with: (All India 2008)
- Bifid pubic symphysis
 - Chordee
 - Anal atresia
 - Intestinal obstruction
22. Epispadias in relation to hypospadias: (PGI 81, UPSC 88)
- Is more common
 - Less common
 - Occurs with the same frequency
 - Is difficult to treat

POSTERIOR URETHRAL VALVE

23. All are true about posterior urethral valve except: (GB PANT 2011)
- Most common in boys
 - Can be detected by prenatal USG
 - Early catheterization should be done
 - Diagnosed by early urethroscopy
24. A three years old boy presents with poor urinary stream. Most likely cause is: (AIIMS June 2003)
- Stricture urethra
 - Neurogenic bladder
 - Urethral calculus
 - Posterior urethral valve
25. A male child with recurrent UTI with dribbling of urine most likely cause is: (Punjab 2011)
- VUR
 - Posterior urethral valves
 - Stricture urethra
 - Neurogenic bladder
26. For posterior urethral valve-investigation of choice is: (BIHAR PG 2014; AIIMS June 97, PGI Dec 2002, Dec 2003, June 2003)
- Cytoscopy
 - MCU
 - Cystourethroscopy
 - Retrograde urethroscopy
27. Posterior urethral valve are commonly observed in:
- Boys
 - Girls
 - Adult males
 - Adult females
28. Most common uropathic obstruction in children is:
- Stricture
 - Stones (UPPG 2009)
 - Posterior urethral valve
 - Anterior urethral valve

29. Most common location of posterior urethral valve:

(PGI SS 2004, MHPGMCET 2008)

- Proximal to verumontanum
- Distal to verumontanum
- At the level of verumontanum
- At the bladder neck

30. Posterior urethral valve is usually seen:

(MHSSMCET 2005, 2006, 2008)

- Above verumontanum
- Below verumontanum
- At the level of bladder neck
- At the level of verumontanum

PHIMOSIS

31. The recommended treatment for preputial adhesions producing ballooning of prepuce during micturition in a 2 years old boy is: (AIIMS June 2003)

- Wait and watch policy
- Circumcision
- Dorsal slit
- Preputial adhesions release and dilatation

32. A five years old child presents with ballooning of prepuce after micturition. Examination of penis reveals prepuce adhesions. Which of the following the best treatment:

(All India 2011)

- Adhesiolysis and dilatation
- Circumcision
- Dorsal slit
- Conservative management

PARAPHIMOSIS

33. Not true about paraphimosis is: (AIIMS June 98)

- Iatrogenic
- Seen in diabetes mellitus
- Gangrene of glans
- Circumcision is the treatment

34. About paraphimosis true is:

(PGI June 96)

- Catheter induced
- Circumcision is treatment
- Hyaluronidase injection
- All of the above

CIRCUMCISION

35. Circumcision is done in a child in which of the following conditions: (TN 91)

- Phimosis
- Recurrent balanitis
- Paraphimosis
- All of the above

36. Indications of circumcision are all except: (MHPGMCET 2002)

- Chronic balanoposthitis
- Jew religion
- Carcinoma penis
- Paraphimosis

PRIAPISM

37. The Grayhack shunt is established between: (All India 2010)

- Corpora cavernosa and corpora spongiosa
- Corpora cavernosa and saphenous vein
- Corpora cavernosa and dorsal vein
- Corpora cavernosa and glans

38. Persistent priapism is rarely seen as a consequence of:

(COMEDK 2010)

- Sickle cell disease
- Leukemia
- Spinal cord disease
- Prolonged sexual activity

39. In Priapism, cavernous blood study will reveal:

(MHSSMCET 2009)

- a. $PO_2 < 30\%$, $PCO_2 > 60\%$ b. $PCO_2 > 60\%$
c. $PCO_2 > 60\%$ d. $PO_2 < 60\%$

40. In children persistent priapism may result due to:

(PGI 81, AIIMS 86)

- a. Thrombosis of venous plexus
b. Leukemia
c. Wilm's tumour
d. Trauma

PEYRONIE'S DISEASE

41. Palpable fibrous plaque on dorsal penile shaft indicates:

(DPG 2005, Karnataka 95)

- a. Paget's disease b. Potter's syndrome
c. Prehn's sign d. Peyronie's disease

42. The following statements are true about Peyronie's disease except:

(AIIMS Nov 2002)

- a. Patient presents with complaints of painful erection
b. Condition affects adolescent males
c. The condition can be associated with Dupuytren's contracture of the tendon of the hand
d. Spontaneous regression occurs in 50% of the cases

43. All are true about Peyronie's disease except:

(UPPG 2007, 2006)

- a. Self limiting
b. Medical treatment is effective
c. Association with Dupuytren's contracture
d. Calcified plaques

44. Peyronie's disease affects:

(WBPG 2014, MHPGMET 2005)

- a. Prostate b. Penis
c. Urinary bladder d. Kidneys

45. Peyronie's disease is:

(MHPGMET 2007)

- a. Browning of penis
b. Ectopic opening of urethra
c. Curved deformity of penis due to fibrous plaque
d. Absent glans penis

46. Nesbitt's operation is done for:

(MHPGMET 2009, 2005)

- a. Ectopic testis b. Hypospadias
c. Peyronie's disease d. Any of the above

47. Nesbitt's operation is done for:

(MHPGMET 2009, 2005)

- a. Ectopic testis b. Hypospadias
c. Peyronie's disease d. Any of the above

48. Dupuytren's contracture is seen in:

(Recent Questions, 2014; 2013)

- a. Peyronie's disease b. Hypospadias
c. Epispadias d. Exstrophy

URINARY TRACT INFECTION

49. What will be next investigation to be done in case of a 2 years old female child with 1st episode of UTI?

(AIIMS June 98)

- a. Abdominal ultrasound b. DMSA scan
c. 6 monthly urine culture d. Nothing actively needed

50. A child with recurrent urinary tract infection is most likely to show:

(All India 2005)

- a. Posterior urethral valves b. Vesicoureteric reflux
c. Neurogenic bladder d. Renal and ureteric calculi

51. Which fruit juice helps in preventing UTI?

(AIIMS Nov 2011, Nov 2006)

- a. Grape b. Raspberry
c. Cranberry d. Orange

52. Commonest organism giving rise to urinary tract infection:

(APPG 85)

- a. E. coli b. Proteus
c. Staphylococcus d. Streptococcus

53. Urinary tract infection exists when the bacterial count in 1 ml. midstream specimen of urine is:

(AIIMS 84)

- a. 100 b. 1000
c. 10^4 d. 10^5 or over

54. The most reliable urine specimen is obtained by:

(UPSC 2005)

- a. Urethral catheterization b. Catheter aspiration
c. Midstream voiding d. Suprapubic aspiration

URINARY RETENTION

55. Acute urinary retention in a male child may be due to:

(AIIMS 87)

- a. Prostatic radiotherapy b. Urethral stricture
c. Hysteria d. Meatal ulcer with scabbing

56. Acute onset of anuria in elderly men:

(All India 89)

- a. Bilateral infraction of kidneys
b. Obstructive urinary disease
c. Acute tubular necrosis
d. Acute cortical

57. Most frequent causes of acute retention of urine include all except:

(DPG 2009 March)

- a. Meatal ulcer with scabbing in children
b. Haemorrhoidectomy
c. Herniorrhaphy d. Fecal impaction

58. Urinary retention in child is most commonly caused by:

- a. Meatal scab with ulceration b. Posterior urethral valve
c. Urethral stricture d. Epispadias (PGI Dec 2003)
e. Congenital short penis

URETHRAL INJURY

59. A 25 years old male presents to emergency department following a road traffic accident. On examination there is pelvic fracture and blood at urethral meatus. Following are true about patient except:

(AIIMS Nov 2002)

- a. Anterior urethra is the most likely site of injury
b. Retrograde urethrography should be done after the patient is stabilized
c. Foley catheter may be carefully passed if the RGU is normal
d. Rectal examination may reveal a large pelvic

60. Not true about urethral injuries is:

(AIIMS Nov 2001)

- a. Catheterize the patient immediately
b. Can be associated with fracture pelvis
c. Bladder injury is associated with post urethral injuries
d. Blood at the external urethral meatus is an imp feature

61. All of the following can be done in a case of pelvic fracture with pelvic hematoma and had not passed urine since trauma except:

(AIIMS Nov 99)

- a. Pass indwelling urethral catheter
b. IV fluid infusion
c. IV pyelography
d. Digital per rectal examination

62. Membranous urethral rupture causes collection of blood in:

(Recent Question, 2014; AIIMS Nov 93)

- a. Ischiorectal fossa
b. Deep perineal pouch
c. Superficial inguinal region
d. Pelvic diaphragm

63. All are true about bulbar urethral rupture, except:

(DNB 2011, AIIMS June 93)

- a. Perineal hematoma
b. Floating prostate on per rectal examination
c. Collection of urine in perineum
d. Bleeding per urethra

64. Following trauma, a patient presents with a drop of blood at the tip of urinary meatus. He complains of inability to pass urine. Next step should be: (All India 2001)

- IVP should be done
- MCU should be done
- Catheterize, drain bladder, and remove the catheter thereafter
- Catheterize, drain bladder and retain in catheter thereafter

65. Catheterization should not be done in case of acute retention of urine due to: (PGI June 2003)

- Benign prostate hyperplasia (BPH)
- CA prostate
- Stricture urethra
- Rupture urethra
- Postoperative retention

66. Urinary catheterization indicated in case of acute retention of urine in following conditions: (PGI June 2006)

- Stricture
- Rupture
- Postoperative
- Carcinoma prostate
- Before appendectomy in acute appendicitis

67. In case of pelvic fracture with urethral injury, the most important first step in management is: (AIIMS 84)

- Repair in injured urethra
- Fixation of pelvic fracture
- Treatment of shock and hemorrhage
- Splinting urethra with catheters

68. Commonest late complication of traumatic rupture of urethra is: (JIPMER 92)

- Diverticulum
- Retrograde ejaculation
- Stricture
- Chordee

69. Rupture of membranous urethra occurs more commonly due to: (AIIMS 92)

- Thin unsupported wall
- Fixity of urethra
- Angulation
- Proximity to bladder

70. Treatment of fracture pelvis with rupture urethra is: (Kerala 95)

- Suprapubic cystostomy
- Explore and correct the fracture, repair urethra
- Catheterization
- Urethrogram to assess injury

71. Urine extravasation occurs in the following in case of penile urethral rupture, except: (JIPMER 2003)

- Ischiorectal fossa
- Scrotum
- Abdominodials
- Below superficial fascia of penis

72. A young man gets into a fight after taking beer and is kicked by the lower abdomen. There was pelvic fracture. Blood at meatus. Most likely cause is: (MAHE 2007)

- Rupture of membranous urethra
- Bulbar urethral injury
- Kidney laceration
- Ureteric injury

73. All the features of membranous urethral injury except: (MAHE 2007, 2008)

- Blood of meatus
- Retention of urine
- Pelvic fracture
- None

74. A patient was brought to the hospital with a history of RTA eight hours back. A few drops of blood were noted at the external urethral meatus. He had not passed urine and his bladder palpable per abdomen. The probable diagnosis is: (AIIMS Nov 2006)

- Urethral injury
- Rupture bladder

- Urethral injury with extravasation of urine in the retroperitoneum
- Anuria due to hypovolemia

75. With the knowledge of anatomy of the pelvis and perineum, which of the following is true regarding collection of urine in urethral rupture above deep perineal pouch? (AIIMS Nov 2012)

- Medial aspect of thigh
- Scrotum
- True pelvis only
- Anterior abdominal wall

76. Following urethral rupture, immediate procedure to be done is: (MCI Sept 2008, March 2009)

- Urinary catheterization
- Suprapubic cystostomy
- Referral to a urologist
- Observation

77. A 32-year-old man with pelvic fracture is in urinary retention with blood at the external urinary means. Retrograde urethrogram shows prostatomembrane disruption. The most appropriate immediate treatment is: (COMEDK 2014)

- Urethral catheterization
- Exploration and repair of urethra
- Suprapubic cystostomy
- Perineal urethrostomy

URETHRAL STRICTURE

78. Which of the following is not an appropriate investigation for anterior urethral stricture? (AIIMS June 97)

- Magnetic resonance imaging
- Retrograde urethrogram
- Micturating cystourethrogram
- High frequency ultrasound

79. The commonest cause of an obliterative stricture of the membranous urethra is: (All India 2003)

- Fall-astride injury
- Road-traffic accident with fracture pelvis and rupture urethra
- Prolonged catheterization
- Gonococcal infection

80. The following are complications of stricture urethra except: (Karnataka 96)

- Periurethral abscess
- Inguinal hernia
- Hydronephrosis
- Papilloma of bladder

81. Commonest cause of urethral stricture in a young person is: (Karnataka 96)

- Trauma
- Gonococcal
- Syphilis
- Tuberculosis

82. The recent treatment of short bridle passable stricture of urethra in the penile and bulbous urethra is:

- Internal urethrotomy with Thompson-Walker's urethrotome (MAHE 2005)
- Optical internal urethrotomy
- Syme's operation
- Wheelhouse operation

83. Optical urethroplasty is done in: (UPPG 2007)

- Congenital stricture of urethra
- Hypospadias
- Epispadias
- Testicular tumors

84. On exertion urine stream increased in: (APPG 96)

- Prostate enlargement
- Marion's disease
- Posterior urethral valves
- Urethral stricture

85. Post gonococcal stricture urethra is most commonly situated in the: (JIPMER 87)

- Bulbar urethra
- Penoscrotal junction
- Distal part of spongy urethra
- Just distal to external meatus

86. Most common cause of urethral stricture is:

- Trauma (Recent Questions 2013)
- Infection
- Congenital
- Post endoscopy

CARCINOMA PENIS

87. True about verrucous carcinoma is all except: (Punjab 2009)

- Locally aggressive form of condyloma acuminata
- Also known as Buschke-Lowenstein Tumor
- They frequently metastasize
- Wide excision is the treatment of choice

88. Buschke-lowenstein tumor is: (MHCET 2016)

- Malignant transformation in plantar wart
- Malignant transformation in anogenital wart
- Malignant transformation in common wart
- Malignant transformation in seborrheic wart

89. In CA penis, soft tissue planes are best delineated by:

- MRI
- CT scan (GB PANT 2011)
- X-ray
- USG

90. The most common cause of death in carcinoma penis:

(MHPGMCET 2008, AIIMS Nov 94)

- Uremia
- Urinary sepsis
- Lung metastases
- Erosion of femoral vessels

91. Cabana procedure is done in: (GB PANT 2010)

- CA testis
- RPLND
- Sentinel LN biopsy in penile carcinoma
- None

92. Sentinel lymph node of carcinoma penis: (MHSSMCET 2006)

- Cabana
- Virchow
- Delphian
- Darwins

93. Erythroplasia of Queyrat occurs in: (MCI Sept 2008)

- Scrotum
- Testes
- Penis
- Bladder

94. Not true about carcinoma penis is: (AIIMS Nov 2001)

- Erythroplasia of Queyrat is a precancerous condition
- 40% of patients are under 40 years of age
- Circumcision if done any time before puberty provides 100% protection against carcinoma penis
- More than 50% patients have inguinal LN enlargement when they present

95. What is true about carcinoma penis? (AIIMS June 94)

- Metastasis is rare
- Occurs more commonly in circumcised male
- Arises from corona of glans
- Pain is frequent

96. Circumcision is included in management of CA penis at:

- Glans
- Prepuce (PGI Dec 98)
- Glandulo prepuccial
- Shaft of penis

97. Features of carcinoma penis are all except: (PGI 85, Kerala 87)

- Circumcision soon after birth provides total immunity
- Metastatic to inguinal nodes
- Surgery is treatment of choice
- Transitional cell carcinoma

98. Treatment of choice of small preputial penile carcinoma is:

- Total penectomy
- Partial penectomy
- Emasculation
- Wide excision (DNB 2007)

99. Sentinel lymph node biopsy was first done in: (DNB 2012)

- Carcinoma breast
- Carcinoma colon
- Carcinoma penis
- Melanoma

100. All are true about carcinoma penis except:

- Most common type is verrucous (Recent Questions 2013)
- Spreads by blood borne metastasis
- Leads to erosion of artery
- Slowly progressive

URETHRAL CARCINOMA

101. Most common site of urethral carcinoma in men is:

(All India 2010)

- Bulbomembranous urethra
- Penile urethra
- Prostatic urethra
- Fossa navicularis

MISCELLANEOUS

102. True about congenital short urethra:

(PGI Dec 2003)

- Urethra is short
- Opening is always ventral
- Prepuce deficient ventrally
- Splitting of the two scrotum in the midline
- Spatulated penis

103. The posterior urethra is best visualized by: (AIIMS Nov 2005)

- Static cystogram
- Retrograde urethrogram
- Voiding cystogram
- CT cystogram

104. Length of the male urethra:

- 10 cm
- 15 cm
- 20 cm
- 25 cm

105. Length of female urethra:

- 2 cm
- 4 cm
- 6 cm
- 8 cm

106. Which part of the male urethra is the widest and most distensible?

- Prostatic
- Membranous
- Bulbous
- Penile

107. The least dilatable part of the urethra:

- Prostatic
- Membranous
- Spongy
- All are equally dilatable

108. Bleeding penile ulcer is seen in all except: (Kerala 94)

- Syphilis
- LGV
- Chancroid
- Granuloma inguinale

109. During urethral catheterization in male patients, resistance is encountered at the following sites except: (ICS 2005)

- Base of navicular fossa
- Mid-penile urethra
- Urogenital diaphragm
- Bulbomembranous junction

110. Smegma is secreted by: (DPG 2008)

- Tyson gland
- Brenner gland
- Cowper's gland
- Bartholin's gland

111. There is a high-risk of renal dysplasia in:

(AIIMS June 2003)

- Posterior urethral valve
- Bladder exstrophy
- Anorectal malformation
- Neonatal sepsis

- 112. Which of the following catheter materials is most suited for long-term is used?** *(All India 2005)*
 a. Latex b. Silicone
 c. Rubber d. Polyurethane
- 113. All are indications for penile angiography except:** *(AIIMS May 2009)*
 a. Painful priapism
 b. Peyronie's disease
 c. Erectile dysfunction
 d. Arterio-venous malformation
- 114. Narrowest part of urethra:** *(PGI SS June 2001)*
 a. External urethral meatus b. Membranous urethra
 c. Prostatic urethra d. Bladder neck
- 115. Narrowest part of the urethra is:** *(MCI March 2009)*
 a. Prostatic urethra b. Bulbar urethra
 c. Penile urethra d. Membranous urethra
- 116. Chordee is not seen in:** *(MHSSMCET 2005)*
 a. Hypospadias
 b. Chronic urethritis
 c. Priapism
 d. Peyronie's disease
- 117. In "three glass test" shreds are presents in first glass only. The most probable diagnosis is:** *(DNB 2012)*
 a. Urethritis b. Cystitis
 c. Prostatitis d. Renal pathology

EXPLANATIONS

HYPOSPADIAS

1. Ans. a. Associated with chordee (Ref: Smith's Urology 17/e p629; Campbell 10/e p3505-3530; Bailey 26/e p1360, 25/e p1362-1363)

HYPOSPADIAS

- Hypospadias results when **fusion of urethral folds is incomplete**, and urethral **meatus opens** on the **underside of penis** or **perineum** (ventral surface of penis)^Q.

- Occurs in **1:250 male births** and **multifactorial**^Q in inheritance.
- Hypospadias is MC congenital malformation of urethra**^Q.

- Estrogens and progestins given during pregnancy increase the risk.
- Anterior forms are more common**^Q than posterior because fusion of urethral folds is from posterior to anterior.
- 70% cases are distal penile or coronal**^Q.
- Circumcision is not done** in patients with hypospadias, as the prepuce can later be **used in surgical repair**^Q.

Types of Hypospadias

<ul style="list-style-type: none"> Glanular Coronal Subcoronal 	<ul style="list-style-type: none"> Penile Penoscrotal 	<ul style="list-style-type: none"> Scrotal Perineal
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- Surgical pathology** in addition to ventrally placed ectopic meatus, hypospadias has:
- Chordee** ventral curvature of penis due to contracture of fibrous cord which has replaced the distal urethra and corpus spongiosum. **Severity of chordee** is proportional to **degree of hypospadias**^Q.
- Hooded prepuce** deficient on ventral aspect and excess on dorsal aspect^Q.
- Stenosis of ectopic meatus**^Q
- Multiple urethral orifices
- Flattening of glans**^Q
- Microphallus

Associated abnormalities

- Undescended testis**^Q (10%) with or without sexual ambiguity
- Inguinal hernia**^Q (10%)
- Urinary tract abnormality (upper and lower)

Associated problems

- Abnormal stream, painful erection** (chordee) and **infertility** (in proximal or posterior types)^Q

Management

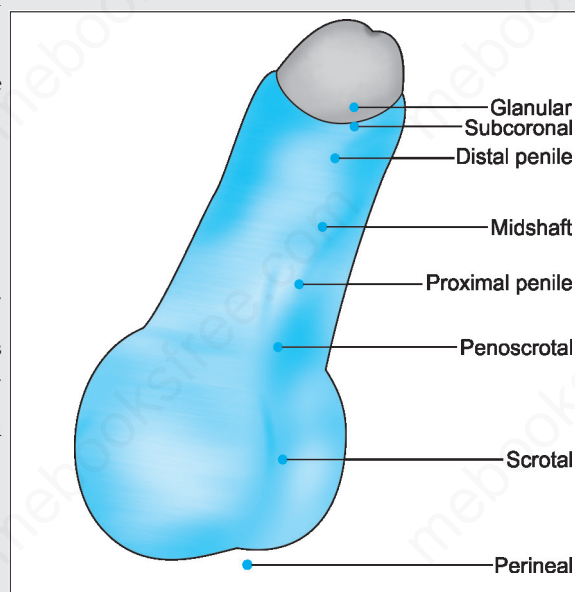
- Treatment is not required in anterior variety. (repair is done for cosmetic reasons only)
- Optimal time of repair is 6–12 months**^Q.
- Meatal advancement or local skin flap advancement**^Q is the surgical procedure done along with removal of chordee.

Named Procedures in Hypospadias

- Dennis-Brown technique** (Two stage)^Q
- MAGPI**^Q (Meatal advancement and glanuloplasty integrated) for coronal or subcoronal
- Mathiew procedure**^Q (Perimeatal based flap, one stage) for distal penile
- Asopa or Duckett**^Q technique using vascularized preputial island (one stage)
- Thiersch-Duplay or Bracka**^Q technique for proximal penile

Complications of surgery

- MC complications is **urethral fistula**^Q (10%)
- Meatal stenosis**^Q due to devascularisation of distal neourethra
- Urethral stricture and stenosis** due to poor vascularity of flap, **persistent chordee**^Q



- Incidence of **hypospadias**: 1 in 250^Q
- Incidence of **horse-shoe kidney**: 1 in 400 (0.25%)^Q
- Incidence of **renal agenesis**: 1 in 1000^Q

2. Ans. a. Defect seen in ventral penis; c. Associated with hooded prepuce; d. Circumcision should be avoided
3. Ans. c. Hypospadias
4. Ans. c. Incidence is 1 in 3000 male births
5. Ans. a. Hypospadias
6. Ans. b. Glandular
7. Ans. b. Avoid surgery till puberty; d. If associated chordee is present, 2 stage operation is done
8. Ans. b. 6–10 months of age
9. Ans. d. Cryptorchidism
10. Ans. b. Dorsal chordee
11. Ans. c. Mental retardation; e. Dorsal chordee
12. Ans. a. Metal stenosis; b. Dorsal hood; c. Proximal opening of meatus
13. Ans. a. Chordee is reversed after 5 years
14. Ans. a. Glandular
15. Ans. c. Karyotyping
16. Ans. a. Ectopia vesicae
17. Ans. a. Hypospadias
18. Ans. a. It is attributed to failure of complete urethral tubularisation in the fetus
19. Ans. d. Statement A is Correct but Statement R is wrong
20. Ans. b. Hypospadias

EPISPADIAS

21. Ans. b. Chordee (Ref: Smith 17/e p631-632; Oxford Handbook of Urology 2/e p652; Campbell 10/e p3369-3375; Bailey 26/e p1360, 25/e p1363-1364)

EPISPADIAS

- Urethra opens on the **dorsum (upper aspect)** of the penis in males, in females there is a **fissure in the wall**^Q of the urethra which opens above the clitoris

Associated anomalies

- **Extrophy of bladder**^Q (ectopia vesicae) with pubic diastasis and waddling gait
- **Dorsal Chordee**^Q
- **VUR** in 40% cases^Q

Clinical Features

- **Females**: **Bifid clitoris** and **separation of the labia**. Most are **incontinent**^Q because of maldevelopment of the urinary sphincters.
- **Males**: Patients with **glandular epispadias** seldom have urinary incontinence. However, incontinence in **penopubic** is 95% and **penile epispadias** is 75%^Q.
- Epispadias is a mild form of bladder extrophy, and in severe cases, extrophy and epispadias coexist.

Management

- **Surgery** is required to **correct the incontinence**, **remove the chordee** to straighten the penis, and **extend the urethra** out onto the glans penis^Q.
- **Bladder augmentation** combined with the **artificial sphincter** may be required in patients in whom incontinence cannot be corrected.

22. Ans. b. Less common

POSTERIOR URETHRAL VALVE

23. Ans. d. Diagnosed by early urethroscopy (Ref: Smith's Urology 17/e p626-628; Campbell 10/e p3389-3404; Bailey 26/e p1359-1360, 25/e p1362)

POSTERIOR URETHRAL VALVE

- Symmetrical folds of urothelium extending distally from prostatic urethra to external urinary sphincter^Q.
 - Exclusively an anomaly of male urethra^Q.
 - Four types, **Type 1** is MC (lies just **distal to the verumontanum** or **at the verumontanum**)^Q

- Acts as a **flap valve**^Q (one way valve)- allows catheter, but balloons out during micturition and obstructs stream.

Clinical Features

- Newborns may present with **palpable abdominal masses** (distended bladder, hydronephrotic kidneys and ascites)^Q
- Infants with **urinary infection** and **sepsis**^Q.
- Sometimes, the **valves** are **incomplete**^Q and the patient remains **without symptoms** until adolescence or adulthood.
- Approximately **30%** of patients experience **end stage renal disease**.^Q
- **Vesicoureteral reflux** occurs in **50%** of patients^Q.

Associated with

- **Oligohydramnios**^Q
- Renal parenchymal dysplasia (**most important factor** in overall **prognosis**)^Q
- Abnormal bladder function (25%)^Q
- **Pulmonary hypoplasia** (MC cause of death)^Q

Investigations

- **Investigation of choice: MCU**^Q (shows proximal urethral dilatation with distal stricture)

- **Cystoscopy**: shows dilation of urethra above valve.
- **Prenatal diagnosis by ultrasound**, showing **bilateral hydroureteronephrosis with enlarged thickened bladder** as early as **28 weeks**^Q of gestation.

Management

- First a small polyethylene **feeding tube** is **inserted** in the bladder and left for several days. Then further management is done according to serum creatinine level.
 - **Normal serum creatinine** - transurethral ablation (**endoscopic fulguration**)^Q of the valves
 - **Increased serum creatinine** and the worsening of condition – **vesicostomy (Blockson's technique is best)** to bypass the obstruction and **when normal creatinine levels** are achieved, transurethral ablation (**endoscopic fulguration**)^Q is done.

Prognosis

- **Bladder dysfunction** and **renal hypoplasia** is associated with **poor prognosis** and is major cause of progressive renal failure^Q.
- **Pulmonary hypoplasia** is MC cause of death^Q.

24. Ans. d. Posterior urethral valve

26. Ans. b. MCU

28. Ans. c. Posterior urethral valve

30. Ans. b. Below verumontanum

25. Ans. b. Posterior urethral valves

27. Ans. a. Boys

29. Ans. b. Distal to verumontanum

PHIMOSIS

31. Ans. a. Wait and watch policy (Ref: *Smith's Urology* 17/e p633; *Campbell* 10/e p964, 3539; *Bailey* 26/e p1359, 25/e p1371)

PHIMOSIS

- Phimosis is a condition in which the **contracted foreskin cannot be retracted over the glans**^Q.
- **Chronic infection** from **poor local hygiene** is its **most common cause**^Q.
- Most cases occur in **uncircumcised males**, although excessive skin left after circumcision can become stenotic and cause phimosis.

Types

- Congenital
- **Acquired**: usually presents late in life and associated with **inflammation, balanitis xerotica obliterans, trauma** or **cancer**^Q.

Clinical features

- **Difficulty in micturition**^Q is the main symptom.
- **Ballooning of prepuce during micturition**^Q is suggestive of phimosis.
- Edema, erythema, and tenderness of the prepuce and the presence of purulent discharge usually cause the patient to seek medical attention.
- Inability to retract the foreskin is a less common complaint.

Complications

- Balanoposthitis, Hydronephrosis or hydroureter
- **Prepuce calculi, carcinoma under foreskin**^Q

Treatment

- Local steroid cream for 4–6 weeks^Q.
- Circumcision should be done if **no response to steroids**, **recurrent balanitis** or **balanoposthitis**, age > 16–18 years^Q.
- If phimosis is associated with considerable **infection**, it should be treated with **broad-spectrum antimicrobial drugs**. The **dorsal slit of foreskin**^Q, if improved drainage is necessary.
- Circumcision for phimosis should be **avoided in children requiring general anesthesia**; except in cases with **recurrent infections**^Q.
- The procedure should be **postponed until** the child reaches an age when **local anesthesia** can be used.

32. Ans. d. Conservative management

PARAPHIMOSIS

33. Ans. b. Seen in diabetes mellitus (Ref: *Smith's Urology* 17/e p633; *Campbell* 10/e p964, 3539; *Bailey* 26/e p1370, 25/e p1373)

PARAPHIMOSIS

- Acquired condition in which the **foreskin**, once retracted over the glans, **cannot be replaced** in its normal position, **always acquired**^Q.
- It is uncommon for the urethra to be compressed, so the **micturition** is normally **not affected**^Q.

Pathology

- **Chronic inflammation** under the redundant foreskin leads to **contracture** of the **preputial opening** (phimosis) and formation of a **tight ring of skin** when the foreskin is retracted behind the glans.
- The **skin ring** causes **venous congestion** leading to **edema** and **enlargement** of the **glans**^Q.
- As the condition progresses, **arterial occlusion** and **necrosis of the glans**^Q may occur.

Treatment

- Ice bags, gentle manual compression^Q and injection of a solution of **hyaluronidase** in normal saline may help to reduce swelling.
- Circumcision: If conservative method fails

34. Ans. d. All of the above

CIRCUMCISION

35. Ans. d. All of the above (Ref: *Smith* 17/e p633; *Bailey* 26/e p1369-1370, 25/e p1371-1372)

36. Ans. c. Carcinoma penis

Indications of Circumcision	
• Phimosis ^Q	• Religion (Jews and Muslims) ^Q
• Paraphimosis ^Q	• Balanitis or balanoposthitis ^Q
• Recurrent UTI ^Q	• BXO (balanitis xerotica obliterans)

PRIAPISM

37. Ans. b. Corpora cavernosa and saphenous vein (Ref: *Smith's Urology* 17/e p632-633; *Campbell's Urology* 10/e p751; *Bailey* 26/e p1373, 25/e p1374; *Glenn's Urologic Surgery* 7/e p489, 490, 491)

The Grayhack shunt is a surgical shunt between corpora cavernosa and saphenous vein for the treatment of **ischemic priapism**.

PRIAPISM

- **Painful, persistent erection**^Q not normally associated with sexual excitement or desire, which doesn't subside after sexual excitement or desire.
- Most patients present with an **erection of at least 24 hours**^Q duration.
- **Priapism is an emergency**, if therapy is delayed for 36–48 hours, then marked tissue damage (due to ischemia) is likely to occur with **cavernosal fibrosis** and **impotence**^Q.

Types

- **High flow (non-ischemic) priapism**^Q: Occurs secondary to **penile or perineal trauma**, arterial sinusoidal shunt within corpus cavernosum.

- **Low flow (ischemic) priapism^Q**: Painful priapism, can lead to **compartment syndrome**, more common than high flow Priapism, caused by-
- **Sickle cell anemia, leukemia, spinal cord lesions, fat emboli, malignant penile inflammation^Q**, autonomic neuropathy, drugs (Trazadone)^Q
- Majority due to **vasoactive intracorporeal injections^Q**

Clinical presentation: Two peak ages

- **Children 5–10 years old**: Most common due to **sickle cell disease^Q**, attacks are usually nocturnal and the patient awakens with painful erection.
- **Adults 20–50 years**: **Mostly iatrogenic^Q**, priapism involves only corpora cavernosa. The spongiosum and glans are flaccid.

Diagnosis

- Diagnosis is **mainly clinical^Q**, only investigation useful to supplement clinical examination is **doppler**.

Treatment

- If present early, **within 4–6 hours**: **Ketamine^Q** (dissociative anesthesia) causes 50% detumescence.

- **Aspiration and saline irrigation** till the aspirate is bright red, followed by injection of diluted **phenylephrine^Q**.
- **Active treatment in high flow priapism** as it represents a **compartment syndrome^Q**.

- **Selective internal pudendal arteriography and selective embolization of the artery feeding the shunt for high flow non-ischemic priapism^Q**
- **Operative intervention**:
- **Winter's procedure** (percutaneous **cavernoglandular shunt^Q**)
 - Corpora spongiosa shunt
 - Corpora saphenous shunt

Surgical Management of Ischemic Priapism (surgical creation of shunt to allow blood to drain from the corpora cavernosa)			
Corporo-glanular shunt	Corporo-spongiosal shunt	Corporo-saphenous shunts	Corporo-dorsal vein shunt
<ul style="list-style-type: none"> • Shunts created between glans penis and corpora cavernosa^Q. • These are distal shunts and represent the first line surgical therapy. Examples: <ul style="list-style-type: none"> • Winter shunt^Q • Al-Ghorab shunt^Q • Ebbehoj and T shunt 	<ul style="list-style-type: none"> • Shunts created between corpora cavernosa and corpora spongiosa^Q • These are proximal shunts and are performed in rare circumstances Examples: <ul style="list-style-type: none"> • Quackel or Sacher shunt^Q 	<ul style="list-style-type: none"> • Shunts created between corpora cavernosa and saphenous vein^Q • Rarely performed Examples: <ul style="list-style-type: none"> • Grayhack shunt^Q 	<ul style="list-style-type: none"> • Shunt between corpora cavernosa and superficial or deep dorsal vein of penis^Q • Rarely performed Examples: <ul style="list-style-type: none"> • Barry shunt^Q

38. Ans. d. Prolonged sexual activity (Ref: Bailey 26/e p1373, 25/e p1374; Campbell 10/e p751)

Priapism is rarely seen as a consequence of spinal cord disease.

PERSISTENT PRIAPISM

- The **penis** remains **erect** and becomes **painful**.
- This is a **pathological erection** and the **glans penis** and **corpus spongiosum** are **not involved^Q**.
- The condition is **usually seen as a complication of a blood disorder** such as **sickle cell disease** or **leukaemia^Q**.
- However, it can sometimes follow **therapeutic injection of papaverine** or even an **abnormally prolonged bout of otherwise normal sexual activity^Q**.
- A **tiny proportion** is caused by **malignant disease** in the **corpora cavernosa** or the **pelvis**.
- Priapism is **rarely seen as a consequence of spinal cord disease^Q**.

39. Ans. a. $PO_2 < 30\%$, $PCO_2 > 60\%$ (Ref: Campbell 10/e p757)

Blood Gas Values in Priapism			
Source	PO_2 (mm Hg)	PCO_2 (mm Hg)	pH
• Normal arterial blood • (room air)	> 90	< 40	7.40
• Normal mixed venous • blood (room air)	40	50	7.35
• Ischemic Priapism • (first corporal aspirate)	< 30 ^a	> 60 ^a	< 7.25 ^a

40. Ans. b. Leukemia

PEYRONIE'S DISEASE

41. Ans. d. Peyronie's disease (Ref: Smith's Urology 17/e p632-633; Campbell 10/e p792-809; Bailey 26/e p1372, 25/e p1373)

PEYRONIE'S DISEASE

- Peyronie's disease (plastic induration of penis/ penile fibromatosis^Q) usually seen over 40 years of age.
 - It is due to fibrous plaques in one or both corpus cavernosum of varying sizes involving tunica albuginea^Q which may later calcify or ossify.
- Cause remains obscure, the dense fibrous plaque is microscopically consistent with findings of severe vasculitis.
- Palmar fibromatosis (Dupuytren's contracture), plantar fibromatosis and penile fibromatosis (Peyronie's disease) are components of the same pathological process called superficial fibromatosis^Q.

Clinical Features

- Painful erection, curvature of penis and poor erection distal to involved area^Q.
- No pain when the penis is in nonerect state.
- Palpable induration or mass appears usually on the dorsolateral aspect^Q of the penis.

Treatment

- Spontaneous remission occurs in about 50% cases^Q, so observation and emotional support advised initially.
- If the penile deformity is distressing, Nesbitt's operation^Q can be performed to straighten the penis.
- Nesbitt operation: Straightening of penis by placing non-absorbable sutures in corpus cavernosum opposite to the plaque.

42. Ans. b. Condition affects adolescent males
43. Ans. b. Medical treatment is effective
44. Ans. b. Penis
45. Ans. c. Curved deformity of penis due to fibrous plaque
46. Ans. c. Peyronie's disease
47. Ans. c. Peryonie's disease
48. Ans. a. Peryonie's disease

URINARY TRACT INFECTION

49. Ans. a. Abdominal ultrasound (Ref: Smith 17/e p194; Campbell 10/e p274)

This patient must be having anatomic genitourinary abnormalities (VUR), and the next best investigation is USG.

Epidemiology of UTI by Age Group and Sex			
Age (years)	Incidence (%)		Risk Factors
	Female	Male	
< 1	0.7	2.7	Foreskin, anatomic GU abnormalities
1-5	4.5	0.5	Anatomic genitourinary (GU) abnormalities
6-15	4.5	0.5	Functional GU abnormalities
16-35	20	0.5	Sexual intercourse, diaphragm use
36-65	35	20	Surgery, prostate obstruction, catheterization
> 65	40	35	Incontinence, catheterization, prostate obstruction

ULTRASOUND

- **Ultrasound study** is an important renal imaging technique because it is **noninvasive**, **easy to perform**, and **rapid** and **offers no radiation or contrast agent risk** to the patient^Q.

50. Ans. b. Vesicoureteric reflux

51. Ans. c. Cranberry (Ref: Smith 17/e p207)

- **Alternatives to antibiotic therapy** in the **treatment of recurrent cystitis/UTI** include **intravaginal estriol**, **lactobacillus vaginal suppositories**, and **cranberry juice taken orally**^Q.
- **Cranberry juice** is traditionally used for **prophylaxis** and **treatment of UTI**^Q.

52. Ans. a. E. coli (Ref: Smith 17/e p195)

URINARY TRACT INFECTION

- **Most UTIs** are caused by a **single bacterial species**^Q.
- At least 80% of the **uncomplicated cystitis** and **pyelonephritis** are due to **E. coli**^Q, with most of pathogenic strains belonging to the **O serogroups**.
- Other less common uropathogens include **Klebsiella**, **Proteus**, and **Enterobacter spp.** and **enterococci**.
- In **hospital acquired UTIs**, a wider variety of causative organisms is found, including **Pseudomonas** and **Staphylococcus spp**^Q.
 - UTIs caused by **S. aureus** often result from **hematogenous dissemination**^Q.
 - **Group B beta-hemolytic streptococci** can cause **UTIs** in **pregnant women**^Q.
 - In **children**, **Klebsiella** and **Enterobacter spp.** are **common causes of UTI**^Q.
- **Anaerobic bacteria**, **lactobacilli**, **corynebacteria**, **streptococci** (not including enterococci) and **S. epidermidis** are found in **normal periurethral flora**. They do not commonly cause UTIs in healthy individuals and are considered common **urinary contaminants**^Q.

53. Ans. d. 10^5 or over (Ref: Smith 17/e p196)

Traditionally, $> 100,000$ CFU/mL ($> 10^5$) is used to exclude contamination.

URINE CULTURE IN UTI

- The **gold standard for identification of UTI** is the **quantitative culture of urine for specific bacteria**^Q.
- The urine should be collected in a **sterile container** and **cultured immediately after collection**. When this is not possible, the urine **can be stored in the refrigerator for up to 24 hours**.
- The sample is then diluted and spread on culture plates. Each bacterium will form a single colony on the plates.
- The **number of colonies** is counted and adjusted per milliliter of urine (CFU/mL).
- Traditionally, $> 100,000$ CFU/mL ($> 10^5$)^Q is used to exclude contamination.

54. Ans. d. Suprapubic aspiration (Ref: Smith 17/e p195)

Suprapubic aspiration avoids potential contamination.

Urinary tract Infection

- Most often, the **urine** is often obtained from a **voided specimen**.
- In **children** who are not toilet trained, a **urine collection device**, such as a bag, is placed over the genitalia, and the urine is cultured from the bagged specimen.
 - **Suprapubic aspiration avoids potential contamination**^Q; however, due to its invasiveness, it is **rarely used except in children and selected patients**.
- Urine obtained from a **urinary catheter** is **less invasive** than a suprapubic aspiration and is **less likely to be contaminated** than that from a **voided specimen**^Q.

URINARY RETENTION

55. Ans. d. Meatal ulcer with scabbing (Ref: Bailey 26/e p1312, 25/e p1315-1318, 24/e p1338-1339; www.ncbi.nlm.nih.gov/pubmed/11176514)

Acute urinary retention in a male child may be due to local inflammatory causes like meatal ulcer with scabbing.

Etiology of Urinary retention in Children	
<ul style="list-style-type: none"> • Neurological processes (17%) • Severe voiding dysfunction (15%) • UTI (13%) • Constipation (13%) • Adverse drug effect (13%) • Local inflammatory causes (7%) 	<ul style="list-style-type: none"> • Locally invading neoplasms (6%) • Benign obstructing lesions (6%) • Idiopathic (6%) • Combined UTI and constipation (2%) • Incarcerated inguinal hernia (2%)

56. Ans. b. Obstructive urinary disease (Ref: Bailey 26/e p1312, 25/e p1316)

Most frequent causes of Acute Urinary Retention		
Male	Both (Males and Females)	
<ul style="list-style-type: none"> • Bladder outlet obstruction (MC) • Urethral stricture • Acute urethritis or prostatitis • Phimosis 	<ul style="list-style-type: none"> • Blood clot • Urethral calculus • Rupture of the urethra • Neurogenic (injury or disease of the spinal cord) • Smooth muscle cell dysfunction associated with ageing 	<ul style="list-style-type: none"> • Fecal impaction • Anal pain (haemorrhoidectomy) • Intensive post-operative analgesic treatment • Some drugs • Spinal anaesthesia
Female		
<ul style="list-style-type: none"> • Retroverted gravid uterus • Bladder neck obstruction (rare) 		

URINARY RETENTION

- In acute urinary retention with significant bladder distention, rapid drainage might precipitate decompression induced hematuria (Ex-vacuo hematuria)^Q
- Catheter should be intermittently clamped and released to permit gradual bladder decompression over 30–60 minutes^Q.

57. Ans. c. Herniorrhaphy

58. Ans. a. Meatal scab with ulceration

URETHRAL INJURY

59. Ans. a. Anterior urethra is the most likely site of injury (Ref: Smith's Urology 17/e p291-295; Campbell 10/e p2516-2520; Bailey 26/e p1361-1363, 25/e p1363-1365)

URETHRAL INJURY

- Urethral injuries occur most often in **men**, usually associated with **pelvic fractures** or **straddle type falls**.
- Urethra is separated in two anatomic divisions:
 - **Posterior urethra: Prostatic urethra + Membranous urethra^Q**
 - **Anterior urethra: Bulbous urethra + Penile urethra^Q**

INJURIES TO POSTERIOR URETHRA

Etiology

- The part of urethra **most likely injured** in pelvic fracture is **membranous urethra^Q**.
- Membranous urethra is **sheared from** the prostatic apex at the **prostatomembranous junction^Q**.

Clinical features

- **Retention of urine + Blood at urethral meatus + Pelvic hematoma** and **High lying prostate^Q**
- The presence of blood at the external urethral meatus indicates that **immediate urethrography^Q** is **necessary** to establish the diagnosis.
- Associated with **deep extravasation of urine** in pelvis and **retroperitoneal tissues^Q**.
- **Pie in sky appearance^Q** on IVP in membranous urethral injury.
- **Superior displacement of the prostate does not occur** if the **puboprostatic ligaments** remain intact.

Instrumental examination

- The only instrumentation involved should be for **urethrography^Q**.

- **Catheterization or urethroscopy should not be done in every case** (as its associated with an **increased risk of hematoma, infection, and conversion of partial urethral tear into complete transection of urethra^Q**).
- In suspected **partial injury**, **gentle single attempt** to catheterize the patient **acts as a stent** over which **urethra heals^Q**.

Complications

- **Bladder rupture** may be associated with posterior urethral injuries in **20% of cases^Q**.

- **Stricture, impotence, and incontinence^Q** are complications of prostatomembranous disruption.

• **Stricture** following **primary repair** and **anastomosis** occurs in about **50%** of cases, with **delayed repair** incidence of stricture can be reduced to about **5%^Q**.

- The incidence of **impotence after primary repair** is **30–80%**, can be **reduced to 30–35%** by **delayed urethral reconstruction^Q**.

TREATMENT

Immediate management

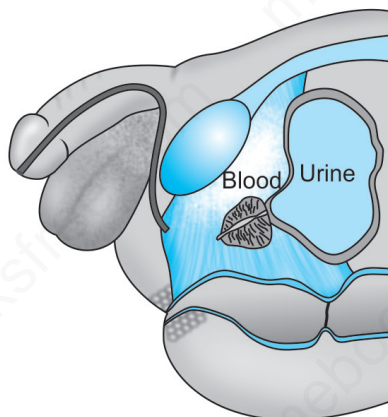
- **No urethral instrumentation or manipulation** and **suprapubic cystostomy**

• In suspected **partial injury**, **gentle single attempt to catheterize** the patient **acts as a stent** over which **urethra heals**.

- **Incomplete laceration** of the posterior urethra **heals spontaneously**, and the **suprapubic cystostomy** can be **removed within 2–3 weeks^Q**.
- **SPC** remains the **gold standard** for **initial management**, **endoscopic alignment** can be done **over guidewire** if patient presents within **7–10 days^Q**.

Delayed urethral reconstruction

- **Reconstruction** of the urethra after prostatic disruption can be undertaken **within 3 months^Q**.



Injury to the posterior (membranous) urethra

60. Ans. a. Catheterize the patient immediately 61. Ans. a. Pass indwelling urethral catheter
62. Ans. b. Deep perineal pouch
63. Ans. b. Floating prostate on per rectal examination (Ref: *Smith's Urology* 17/e p291-295; *Campbell* 10/e p3748-3749; *Bailey* 26/e p1361-1363, 25/e p1363-1365)

INJURIES TO ANTERIOR URETHRA

Etiology

- **Direct blow to the perineum^Q** is the mechanism of injury.
- **Straddle injury^Q** may cause laceration or contusion of the urethra.
- **Self-instrumentation or iatrogenic instrumentation** may cause **partial disruption^Q**.

Pathology and pathogenesis: MC site is bulbar urethra.

A. Contusion

- Is a sign of crush injury without urethral disruption. Perineal hematoma usually resolves without complications.

B. Laceration

- A **severe straddle injury^Q** may result in laceration of part of the urethral wall, allowing extravasation of urine.
- If the **extravasation** is unrecognized, it may **extend into the scrotum, along the penile shaft, and up to the abdominal wall** and **limited only by Colles' fascia** and often results in **sepsis, infection, and serious morbidity^Q**.

Clinical Features

- **Retention of urine + Blood at urethral meatus + Perineal hematoma** and **Normal prostate** on P/R^Q

- **Superficial extravasation of urine**, urine collects in **scrotum, anterior perineum**, beneath **superficial fascia of penis** and spreads **under fascia scarpa**^Q.

- **Massive urinary extravasation and infection** in the perineum and scrotum in delayed presentation

Complications

- **Heavy bleeding** from **corpus spongiosum** injury and **urethral meatus**^Q.
- **Sepsis and infection**^Q due to **urinary extravasation** (**Aggressive debridement** and **drainage** for infection)
- **Stricture** at the site of injury^Q

Treatment

- **Urethral contusion**
 - After urethrography, if the voiding occurs normally, without pain or bleeding, no additional treatment.
- **Urethral lacerations:**
 - **Suprapubic cystostomy**^Q for complete urinary diversion while the urethral laceration heals.
- **Urethral laceration with extensive urinary extravasation:**
 - Suprapubic cystostomy for urinary diversion and antibiotic therapy for Infection and abscess formation

Prognosis

- **Urethral stricture** is a major complication but in **most cases** do **not require surgical reconstruction**^Q.

64. Ans. d. Catheterize, drain bladder and retain in catheter thereafter

65. Ans. d. Rupture urethra

66. Ans. c. Postoperative, d. Carcinoma prostate

67. Ans. c. Treatment of shock and hemorrhage

68. Ans. c. Stricture

69. Ans. b. Fixity of urethra

70. Ans. a. Suprapubic cystostomy

71. Ans. a. Ischiorectal fossa (Ref: *Smith's Urology* 17/e p291-295; *Campbell* 10/e p3748-3749; *Bailey* 26/e p1361-1363, 25/e p1363-1365)

	Bulbar urethral injury	Membranous urethral injury
Incidence	• More common ^Q	• Less common
Mechanism of injury	• Direct blow to the perineum (Straddle injury) ^Q	• Blunt pelvic trauma with fracture pelvis ^Q
Signs and symptoms	<ul style="list-style-type: none"> • Retention of urine^Q • Blood at urethral meatus^Q • Perineal hematoma^Q • Normal prostate^Q 	<ul style="list-style-type: none"> • Retention of urine^Q • Blood at urethral meatus^Q • Pelvic hematoma^Q • High lying prostate^Q
Urine extravasation	• Superficial extravasation ^Q	• Deep extravasation ^Q

72. Ans. a. Rupture of membranous urethra

73. Ans. d. None

74. Ans. a. Urethral injury

75. Ans. c. True pelvis only

76. Ans. b. Suprapubic cystostomy

77. Ans. c. Suprapubic cystostomy

URETHRAL STRICTURE

78. Ans. a. Magnetic resonance imaging (Ref: *Smith* 17/e p633-636; *Oxford Handbook of Urology* 2/e p122; *Campbell* 10/e p967-983; *Bailey* 25/e p1367-1369)

STRICTURE URETHRA

- Area of narrowing in the caliber of the urethra due to formation of scar in the tissues surrounding the urethra
- **Male urethra** is **more prone to trauma** and **stricture**^Q formation.
- **Large catheters and instruments** are more likely than small ones to cause **ischemia, internal trauma** leading to **stricture**^Q.

Etiology

- **Traumatic (MC)**^Q, straddle injuries for anterior and pelvic fracture for posterior urethra
- **Inflammatory or infectious** (Infection from **long-term catheter use**^Q is a major cause, gonococcal urethritis is seldom a cause of strictures today)
- **Ischemia**
- **Malignant**
- **Congenital** (**Fossa navicularis** and **membranous urethra** is **MC site**^Q of congenital urethral stricture)

Pathophysiology

- Healing occurs by scar formation after injury to urothelium
- Process of **scar formation** occurs in **spongy erectile tissues**^Q (corpus spongiosa) of the penis that surrounds urethra (**spongiofibrosis**^Q)
- Scar tissue contracts, reduces the caliber of urethral lumen, causing **resistance** to **antegrade flow** of urine.

Clinical Features

Obstructive voiding symptoms

- **Decreased force** of urinary stream, improving with pressure (MC)^Q
- **Spraying or double stream**^Q
- **Incomplete emptying** of the bladder, **terminal dribbling** and urinary **intermittency**^Q
- Urinary retention, dilation of proximal urethra and prostatic ducts, urinary tract infections

Complications

- Prostatitis, cystitis, urinary diverticula and chronic UTI
- **Severe prolonged obstruction** result in decompensation of UV junction resulting in **reflux, hydronephrosis** and **renal failure**^Q
- **Urethral fistula** and **periurethral abscess**^Q commonly develop in association with chronic severe strictures

Diagnosis

- **Location, length, depth and density** of stricture should be evaluated for appropriate treatment.
- **Retrograde urethrogram** or **MCU**^Q to demonstrate location and extent of stricture

RGU

- **MCU and RGU, both are required for adequate assessment**
- **MCU for posterior urethra, RGU for anterior urethra**
- **Cystourethroscopy** for visualization of stricture
- **High frequency ultrasound** for **short bulbar strictures** (more accurate in measuring stricture length than RGU and is helpful in determining whether to excise or graft)
- **MRI** for defining the **distorted pelvic anatomy** associated with **posterior urethral strictures**^Q resulting from trauma.

Management

- **Periodic urethral dilations** to stretch the scar without producing additional scarring.
- **Internal urethrotomy**: Incising the stricture transurethally using endoscopic equipment to release scar tissue. The incision is made under direct vision at **12 O'clock** position with urethrotome, with curative success rate of **20–35%** (**Good success in short strictures without spongiositis**^Q)

Open reconstruction

- **Excision and re-anastomosis** for strictures **< 2 cm**^Q: Complete excision of the fibrotic segment with a widely spatulated **tension-free re-anastomosis**, most dependable technique
- **Excision and tissue transfer** for strictures **> 2 cm**^Q: Full-thickness skin graft tissue is harvested from the desired non-hair bearing location, **penile skin, bladder epithelium, or buccal mucosa** (MC and **best results**)^Q.
- **Urethral stents**: Endoscopically placed, designed to be incorporated into wall of urethra and provide a patent lumen.

79. Ans. b. Road-traffic accident with fracture pelvis and rupture urethra

80. Ans. d. Papilloma of bladder

81. Ans. a. Trauma

82. Ans. b. Optical internal urethrotomy (Ref: Campbell 10/e p971-972)

Campbell says "The data show that **strictures at the bulbous urethra** that are **< 1.5 cm in length** and **not associated with dense, deep spongiositis** (i.e. straddle injuries) can be **managed with internal urethrotomy**, with a **74% moderately long-term success rate**."

INTERNAL URETHROTOMY

- Internal urethrotomy refers to any procedure that **opens the stricture by incising it transurethally**^Q.
- **Internal urethrotomy** is done for **short, soft, passable, bulbar stricture**.
- The urethrotomy procedure **involves incision through the scar to healthy tissue** to allow the **scar to expand** (release of scar contracture)^Q and the lumen to heal enlarged.
- **MC complication of internal urethrotomy** is **recurrence of stricture**.
- The data show that **strictures at the bulbous urethra** that are **< 1.5 cm in length** and **not associated with dense, deep spongiositis**^Q (i.e. straddle injuries) can be **managed with internal urethrotomy**, with a **74% moderately long-term success rate**^Q.

83. Ans. a. Congenital stricture of urethra (Ref: www.ncbi.nlm.nih.gov › Postgrad Med J › v.82(970); Aug 2006)

- **Short bulbar strictures** as a result of trauma or otherwise **congenital** are **best treated by anastomotic urethroplasty**^Q.

84. Ans. d. Urethral stricture

85. Ans. a. Bulbar Urethra

86. Ans. a. Trauma

CARCINOMA PENIS

87. Ans. c. They frequently metastasize (Ref: *Smith's Urology 17/e p383-386; Campbell 10/e p901-933; Bailey 26/e p1373-1375, 25/e p1374-1375*)

CARCINOMA PENIS

- Most commonly occur in 6th decade^o of life, but "40% patients are less than 40 years"
- Most commonly associated etiologic factor is **poor hygiene^o**
- **Phimosis^o** is commonly associated (50%)

- **Neonatal circumcision** confers **immunity^o** against CA penis, HIV or STDs, but **not if done later.**

- Most important **carcinogens** are **smegma** and **HPV infection (16,18,31,33)^o**.

Premalignant Lesions

- **Buschke-Lowenstein tumour^o** (Verrucous carcinoma): tumour destroy adjacent tissue by compression, no metastasis usually. (Locally Malignant)
- **Balanitis Xerotica Obliterans^o**: whitish patch on glans, meatus and urethra, meatal stenosis.
- **Leukoplakia^o** (more common in **diabetics**)
- Cutaneous horn
- Long standing genital warts

Carcinoma in Situ

- **Bowen's disease^o**: Intraepithelial skin neoplasm (solitary thickened, grey white plaque with ulceration and scabbing) with HPV association in 80% cases. Converts into infiltrating SCC in 10%. **No high incidence of visceral malignancy.** When it involves **glans** and **prepuce**, it is called **Erythroplasia of Queyrat^o**
- **Erythroplasia of Queyrat^o**: Red velvety plaques over **glans** or **prepuce**, treated by 5% 5-FU cream or ND YAG laser.

Clinical Features

- **Squamous cell carcinoma (80%)^o** is the MC type, most commonly originates from **glans^o** > sulcus > prepuce > shaft.
- Others are **transitional cell carcinoma (15%)**, basal cell carcinoma, malignant melanoma, sarcoma.
- MC symptom is **lesion itself** associated with foul smelling discharge.
- **Phimosis** is associated in 50%.
- There is **little or no pain.**
- Lesions are typically confined to penis at the time of presentation.

- **More than 50% patients** of CA Penis presents with **enlarged inguinal lymph nodes^o**.
- 50% of patients presenting with **enlarged lymph inguinal lymph nodes** are **reactive** (non-metastatic), used to **subside after 4-6 weeks of antibiotics^o**.
- **Priapism** is the MC and earliest symptom of **metastatic CA penis^o**.
- MC cause of death is bleeding caused by **erosion of femoral artery** by **metastatic inguinal lymph nodes^o**.
- 2nd MC cause of death is **sepsis.**

- **Hypercalcemia^o** is seen in **absence** of **osseous metastasis** in 20% of patients, appears to **correlate with volume of disease^o**.

Patterns of spread

- **Buck's fascia^o** and **tunica albuginea** represents a **barrier to corporal invasion** and **hematogenous spread.**
- Primary dissemination is to **inguinal, femoral** and **iliac LNs.**

- **Prepuce** and **shaft skin** drain into the **superficial inguinal LNs^o** (Superficial to tensor fascia lata).
- **Glans** and **corporal bodies** drain to **both superficial and deep inguinal LNs^o** (deep to tensor fascia lata).
- **Anterior urethra** to **inguinal LN** and **posterior urethra** to **internal iliac LNs.**
- **Penile drainage** is **bilateral** because of **multiple cross-connections^o**.

- Penetration of buck's fascia and tunica albuginea leads to invasion of vascular corpora and vascular dissemination (rare).
- **Distant metastases** in < 10% cases, may involve **lung, liver** bone or brain.

Diagnosis

- **Good incisional biopsy^o** from the periphery of the lesion from its junction with the normal tissue for grade and depth of invasion is **mandatory for diagnosis.**

- **Sentinel lymph node biopsy (CABANA procedure)** is done for inguinal LN status.

Radiological investigations

- Assessment of depth by **USG** or **MRI^o** (CT is not effective)

- **MRI** is **IOC** for staging in **CA penis.**

Treatment

- Without any treatment of invasive carcinoma, **death within 2 years**.
- **Small non-invasive lesion involving prepuce:** 5-FU cream, Nd-YAG laser, radiotherapy + close follow up is mandatory/ Wide excision or circumcision

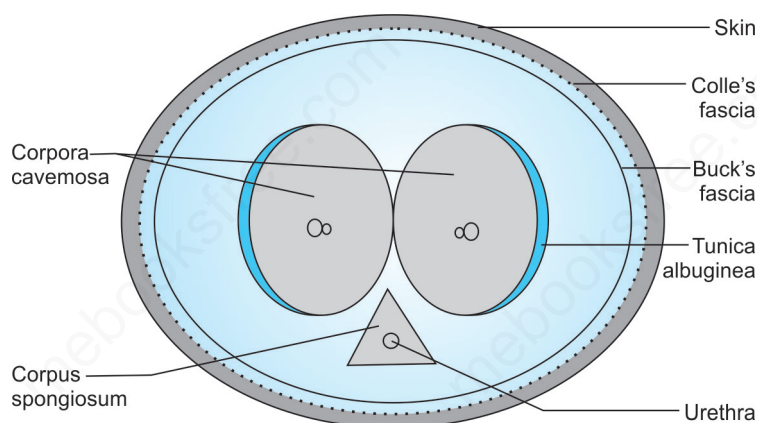
- Lesions involving **glans or distal shaft:** Partial penectomy with 2 cm margin^Q
- Lesions involving **proximal shaft** or 2 cm margins are not achieved: **Total penectomy with perineal urethrostomy^Q**.
- **Bilateral Ilioinguinal LN dissection^Q** for metastatic lymph nodes.

- Chemotherapy used are **Bleomycin**, 5-FU, **Cisplatin**, methotrexate.
- Radiotherapy for selected **superficial small lesions**.

Prognosis

- Survival correlates with **presence or absence of nodal disease^Q**.

Jackson (Extent of spread) ^Q Staging for CA Penis	
Stage I	Confined to glans or prepuce
Stage II	Extension to shaft
Stage III	Operable inguinal LN metastasis
Stage IV	Inoperable inguinal LN metastasis or local or advanced spread



Cut section of penis

7 th AJCC (2010) TNM Staging for CA Penis	
T: Primary tumor	N: Regional lymph nodes
Tis: Carcinoma in-situ	N1: Metastasis in single superficial inguinal LN
Ta: Noninvasive verrucous carcinoma	
T1a: Invades subepithelial connective tissue without lymphovascular invasion and is not poorly differentiated	N2: Metastasis in multiple or bilateral superficial inguinal LNs
T1b: Invades subepithelial connective tissue with lymphovascular invasion or poorly differentiated	N3: Metastasis in deep inguinal or pelvic LNs
T2: Invades corpus spongiosum or cavernosus	
T3: Invades urethra	M: Distant metastases
T4: Invades other adjacent structures	M0: No distant metastasis
	M1: Distant metastasis present

Stage 0	Stage I	Stage II	Stage IIIA	Stage IIIB	Stage IV
Tis N0M0 Ta N0M0	T1a N0M0	T1b N0M0 T2 N0M0 T3 N0M0	T1-3 N1 M0	T1-3 N2 M0	T4 any N M0 Any T N3 M0 Any T any N M1

88. Ans. b. Malignant transformation in anogenital wart
 89. Ans. a. MRI
 90. Ans. d. Erosion of femoral vessels
 91. Ans. c. Sentinel LN biopsy in penile carcinoma
 92. Ans. a. Cabana
 93. Ans. c. Penis
 94. Ans. c. Circumcision if done any time before puberty provides 100% protection against carcinoma penis
 95. Ans. c. Arises from corona of glans
 96. Ans. b. Prepuce
 97. Ans. d. Transitional cell carcinoma
 98. Ans. d. Wide excision
 99. Ans. c. Carcinoma penis (Ref: *Mastery of Surgery* 5/e p1531)

"The historic contribution by Cabana in 1977 (Cancer 1977; 39:456) established the importance, lymphatic histology with sentinel lymph node mapping of patients with penile carcinoma. This approach identified the sentinel lymph node as the first site of residual nodal metastasis and is predictive of the nodal status of the remaining node basin."

100. Ans. a. Most common type is verrucous

URETHRAL CARCINOMA

101. Ans. a. Bulbomembranous urethra (Ref: *Smith* 17/e p416-417; *Campbell* 10/e p946-951; *Bailey* 25/e p1367, 25/e p1370)

CARCINOMA OF MALE URETHRA

- Chronic irritation and infection^Q are the strongest risk factors
- Incidence of urethral stricture in men with development of urethral cancer: 24–76%^Q
- HPV-16^Q has a causative role in SCC of urethra
- MC presenting symptom: palpable mass associated with obstructive voiding symptoms^Q

Pathology

- MC site is bulbomembranous urethra^Q > penile urethra > prostatic urethra

- Overall, MC type is SCC^Q > TCC > adenocarcinoma.
- MC type of carcinoma prostatic urethra are TCC^Q > SCC.
- MC type of carcinoma penile urethra are SCC^Q > TCC.

- Lymphatics of the anterior urethra drain into the superficial and deep inguinal LNs^Q
- Lymphatics of the posterior urethra drain into external iliac, obturator and hypogastric LNs^Q.

Diagnosis

- MRI with gadolinium is IOC for evaluating local soft tissue, LNs metastasis^Q

Treatment

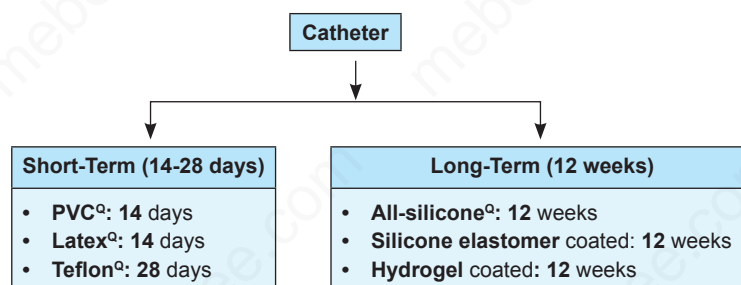
- Surgery is mainstay of treatment^Q. Radiotherapy is also used.
- Ilioinguinal node dissection only in presence of palpable adenopathy.

MISCELLANEOUS

102. Ans. a. Urethra is short
 103. Ans. c. Voiding cystogram (Ref: *Sutton Radiology* 7/e p898-899)
 • Voiding cystourethrography is the best method to visualize the posterior urethra^Q.
 • Anterograde techniques are best for visualization of posterior urethra^Q.
 • Reterograde techniques (contrast is injected through tip of urethra) is best for visualization of anterior (penile) urethra^Q.
 104. Ans. c. 20 cm
 105. Ans. b. 4 cm
 106. Ans. a. Prostatic
 107. Ans. b. Membranous
 108. Ans. a. Syphilis
 109. Ans. b. Mid-penile urethra
 110. Ans. a. Tyson gland
 • Tyson's Glands ultimately produce an oily substance, which, when mixed with shed skin cells, constitute smegma^Q.
 111. Ans. a. Posterior urethral valve
 • Renal parenchymal dysplasia is the most important factor in overall prognosis^Q in posterior urethral valve.

112. Ans. b. Silicone (Ref: www.nursing-standard.co.uk)

- All silicone catheters are suitable for use in patients with latex allergy and can remain in situ for 12 weeks^Q or according to manufacturer's instruction.



113. Ans. a. Painful priapism

- Penile angiography is indicated in high flow, non-ischemic priapism, which is painless^Q.
- It is not indicated in painful (low-flow) priapism^Q.

114. Ans. a. External urethral meatus

115. Ans. d. Membranous urethra

116. Ans. c. Priapism

117. Ans. c. Prostatitis check (Ref: [Bailey 26/e p1357](#))

THREE GLASS URINE TEST

- The three glass urine test is valuable in diagnosis of chronic prostatitis
- If the first glass with the initial voided sample shows urine containing prostatic threads, prostatitis is present.

Testis and Scrotum

MULTIPLE CHOICE QUESTIONS

UNDESCENDED TESTIS

- Best time for surgery of undescended testis is:
(Recent Question 2014, 2015; All India 2010)
 - Just after birth
 - 6 months of age
 - 12 months of age
 - 24 months of age
- Surgery for undescended testis is recommended at what age?
(COMEDK 2014, All India 2011)
 - 6 months
 - 12 months
 - 24 months
 - 36 months
- Incidence of undescended testis in normal new born:
 - 3%
 - 6%
 - 9%
 - 12%
 (DNB 2007)
- Most common tumors in undescended testis:
(DNB 2005, Punjab 2009)
 - Seminoma
 - Teratoma
 - Embryonal carcinoma
 - None
- Stephen Fowler surgery is done for:
(GB PANT 2010)
 - Ectopic testis
 - Undescended testis
 - Hypospadias
 - Epispadias
- All can be prevented by orchiopexy in cryptorchidism except:
(AIIMS Nov 99)
 - Testicular tumor
 - Epididymo-orchitis
 - Torsion of testis
 - Sexual ambiguity
- Which of the following investigation is used to confirm anorchia?
(AIIMS Nov 2013)
 - PET
 - MRI
 - Laparoscopy
 - USG
- Orchiopexy is done in cases of undescended testis at the age of:
(AIIMS June 2006)
 - Infancy
 - 1-2 years
 - 5 years
 - Puberty
- What is not seen in undescended testis?
(AIIMS June 95)
 - Hydrocele
 - Hernia
 - Teratoma
 - Seminoma
- Incompletely descended testis is commonest on:
(JIPMER 78, 79, PGI 85)
 - Right side
 - Left side
 - Both side
 - Right sided only

- A 5-years old male child has been brought with a complaint that there is only one testis in the scrotum. On examination, it is found that the testis on the opposite side is felt in the inguinal canal. The patients should be advised: (UPSC 96)
 - Orchiopexy
 - To wait till puberty
 - Orchidectomy
 - Administration of androgens
- Which one of the following statement is true of undescended testis?
(UPSC 97)
 - Usually descends spontaneously at puberty
 - Orchiopexy to be done if no descent by puberty
 - Has higher incidence of malignancy
 - Maintains normal sperm production
- True about incompletely descended testis are all of the following except:
(MCI March 2008)
 - Early repositioning can preserve function
 - It may lead to sterility, if bilateral
 - Poorly developed secondary sexual characters
 - May be associated with indirect inguinal hernia
- Testis does not descend beyond:
(JIPMER 2012)
 - 2 months
 - 4 months
 - 6 months
 - 8 months

ECTOPIC TESTIS

- Most common site of ectopic testis:
(GB PANT 2010)
 - Superficial inguinal pouch
 - Root of penis
 - Femoral triangle
 - Perineum
- Ectopic testis is found in all location except:
(AIIMS 87)
 - Lumbar
 - Perineal
 - Intra abdominal
 - Inguinal
- Complication of ectopic testis is:
(Kerala 94)
 - Seminoma
 - Atrophy
 - Torsion
 - All

TESTICULAR TORSION

- True about torsion of testis is all except: (AIIMS Nov 2001)
 - Presents with sudden pain in testis
 - Commonly associated with pyuria

- c. Doppler U/S shows decreased blood flow to the testis
d. Simultaneous orchiopexy of the other side should also be done
19. A 30-years old male patient presents with sudden onset swelling and pain over the right hemiscrotum. On examination the scrotum is reddened and tender. Which of the following statement about the affecting condition is not true? (All India 2008)
- Probable diagnosis is torsion
 - The right testis is likely to ride high in the scrotal compartment
 - If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery immediately
 - If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery after 14 days
20. All of the following abnormalities are predisposing causes for torsion of the testis except: (COMEDK 2006)
- Inversion of testis
 - Low investment of tunica vaginalis
 - Between 10 to 25 years of age
 - Separation of the epididymis
21. All are true regarding torsion of the testis, except:
- Common in adolescents and young adults (Orissa 2011)
 - Inversion of testis is the most common predisposing cause
 - Elevation of testis reduces the pain
 - If diagnosis is doubtful, prompt exploration is the rule
22. A 40-years old man in suffering from fever and pain in scrotum which is not relieved by elevation of testis, 3 days before had sexual contact with a young female: (All India 97)
- Testicular tumor
 - Acute epididymitis
 - Torsion of testis
 - Acute orchitis
23. Torsion of testis has to be treated within: (DNB 2007)
- Immediately
 - 6 hours
 - 12 hours
 - 15 hours
24. In testicular torsion, surgery within how much time can save viability of testis? (Recent Question 2013)
- 6 hour
 - 12 hour
 - 24 hour
 - 1 weeks
25. All the following statements are true regarding torsion of testis except: (APPG 2015)
- Most common between 10 and 25 years of age
 - Prompt exploration and twisting & fixation is the only way to save the torqued testis
 - Anatomical abnormality is unilateral and contralateral testis should not be fixed
 - Inversion of testis is the most common predisposing cause
28. In the treatment of varicocele, testicular vein ligation is done at the level of: (DPG 96)
- Above inguinal ligament
 - Below inguinal ligament
 - Neck of the sac
 - Scrotum
29. Which is not true regarding varicocele? (All India 88)
- Testicular veins involved
 - More common on the right side
 - May be the first feature of a renal tumour
 - Feels like a bag of worms
30. A 58-years old male presenting with acute onset of varicocele on left side most probable cause: (CMC 98)
- CA testes
 - Epididymitis
 - Inguinal lymph nodes
 - CA kidney
31. Varicocele of pampiniform plexus of veins has all the following characteristics except: (MPPG 97)
- Negative transillumination test
 - Reducible
 - Cough impulse is present
 - Frequently on right side
32. Most common cause of surgically treatable male infertility is: (MAHE 98)
- Varicocele
 - Cryptorchidism
 - Stricture urethra
 - Epididymitis
33. Which of the following is true about varicocele except?
- Incompetent valves of testicular vein are responsible for varicocele (MAHE 2006)
 - 90% are on the left side
 - Asymptomatic cases require surgery
 - Femoral catheterization with spermatic vein ablation is done in recurrence
34. With reference to varicocele, which one of the following is not true of it? (UPSC 2007)
- Varicosity of cremasteric veins
 - Left side is affected usually
 - Feel like a bag of worms
 - May lead to infertility
35. After varicocele surgery, venous drainage occurs by:
- Cremasteric veins (MHSSMCET 2006)
 - Penile veins
 - Ectopic in the iliac fossa
 - Present at the usual location
36. True about varicocele is: (DNB 2007)
- More common on right side
 - Can cause oligospermia
 - No effect on valsalva
 - Lies anterior to testis
37. A young adolescent male came with painless swelling in scrotum since 2-3 months. On palpation, it feels like a bag of worms. What is the possible diagnosis? (MHSSMCET 2010)
- Varicocele
 - Testicular abscess
 - Epididymo-orchitis
 - Hydrocele
38. True about varicocele due to renal cell carcinoma is:
- More common on right side (MHPGMCET 2003)
 - Temperature induced damage to testes occurs
 - Cough impulse is positive
 - Does not decompress in supine position
39. Operative managements of varicocele are indicated in which of the following conditions(s)? (PGI Dec 2008)
- Ipsilateral testis small size
 - Oligospermia on semen analysis
 - Grade- 3 varicocele (large size)
 - Signs or symptoms present
 - Subclinical presentation

VARICOCELE

26. Not true about varicocele is: (AIIMS Nov 2001)
- Common on the right side
 - Can present as a later sign of renal cell carcinoma
 - Has bag of worm like feeling
 - Can lead to infertility
27. Varicocele is common on left testis because: (All India 98)
- Left testicular vein drains into IVC which has high pressure
 - Left testicular vein drains into left renal vein which has high pressure
 - Left testis is lower situated
 - Compression of testicular vein by rectum

40. Bag of worm like sensation is felt in: (Recent Question 2015)
- Varicocele
 - Hydrocele
 - Torsion of testis
 - Congenital hernia

SPERMATOCELE

41. Regarding spermatocele which is correct? (PGI 88)
- Occurs in head of epididymis
 - Barely water fluid in appearance
 - Tender
 - Contain spermatozoa
42. Chinese lantern on transillumination seen in: (Recent Question 2014)
- Spermatocele
 - Epididymal cyst
 - Hydrocele of cord
 - Secondary Hydrocele
43. Regarding spermatocele all are correct except:
- Occurs in the head of Epididymis
 - Barley water fluid
 - Tender
 - Contain spermatozoa

HYDROCELE

44. Hydrocele is labeled 'vaginal' when it is: (AIIMS 96)
- Limited to scrotum
 - Upto inguinal canal
 - Communicating into coelomic cavity
 - Upto deep inguinal ring
45. Treatment of a large hydrocele in an infant: (Kerala 97)
- Repeated aspirations
 - Ligation of sac at the opening of inguinal canal
 - Herniotomy
 - Eversion of sac
46. Cause of hydrocele in infants: (CMC 98)
- Patent processus vaginalis
 - Patent gubernaculum
 - Impaired drainage
 - Epididymal cyst
 - Infection
47. Congenital hydrocele is best treated by: (DNB 2009, 2008, 2005, 2001, Punjab 2011, AIIMS June 2001)
- Eversion of sac
 - Excision of sac
 - Lords procedure
 - Herniotomy
48. Which is false about hydrocele? (APPG 2008)
- Almost always fluid is transudate
 - Get above the swelling
 - Testis is separate from swelling
 - Obscures inguinal hernia
49. Lord's and Jaboulay's operation is done for: (AMU 2005)
- Rectal prolapsed
 - Fistula in ano
 - Inguinal hernia
 - Hydrocele
50. Lord's placcation is done for: (All India 2010)
- Inguinal hernia
 - Testicular cancer
 - Hydrocele
 - Testicular varices
51. Classical treatment of hydrocoele: (DPG 2008)
- Aspiration
 - Aspiration and sclerosant agent
 - Surgery
 - Tapping

EPIDIDYMO-ORCHITIS

52. Most common cause of acute epididymitis in males: (COMEDK 2010, GB PANT 2011)
- E. coli
 - Proteus
 - Chlamydia trachomatis
 - N. gonorrhoea
53. Positive Prehn's sign is: (DNB 2010)
- Elevation of testis increases pain of epididymitis
 - Elevation of testis reduces pain of epididymitis
 - Depression of testis increases pain of epididymitis
 - Depression of testis reduces pain of epididymitis
54. T.B. testis first affects: (DPG 95)
- Vas
 - Epididymis
 - Body of testis
 - Tunica vaginalis
55. True about acute epididymitis is: (AIIMS Feb 97, All India 96)
- Associated with urinary infection
 - Painless
 - Scrotum size is reduced
 - Does not mimic with torsion of testes
56. A 16-years old boy presents with acute onset pain in the left testis. The following statements about his management are true except: (AIIMS Nov 2005)
- The patient should be prescribed antibiotics and asked to come after a week
 - Colour flow Doppler will be very useful in diagnosis
 - Scrotal exploration should be done without delay if Doppler is not available
 - If left testis is not viable on exploration, patient should undergo left Orchidectomy and right orchidopexy
57. Orchitis without epididymitis is seen in: (All India 92)
- Gonorrhoea
 - Tuberculosis
 - Syphilis
 - Chlamydia infection
58. In differential diagnosis of epididymo-orchitis and torsion it is important that: (AIIMS 95)
- Elevation of testis in torsion relieves pain
 - Elevation of testis in epididymo-orchitis relieves pain
 - Tenderness is characteristic of torsion of testis
 - Fever is characteristic of epididymo-orchitis
59. Acute orchitis all are seen except: (Recent Question 2013)
- Increased local temperature
 - Decreased blood flow
 - Erythematous scrotum
 - Raised TLC
60. Prehn sign is seen in: (Recent Question 2015; 2013)
- Acute orchitis
 - Chronic orchitis
 - Testicular torsion
 - None
61. Which of the following statements is true regarding acute epididymitis? (APPG 2016)
- All the statements are true
 - Mostly bilateral
 - Absence of blood flow on doppler Examination
 - Occurs in young sexually active men and is commonly due to C. trachomatis

FOURNIER'S GANGRENE

62. Fournier's gangrene occurs in the: (JIPMER 90)
 a. Toes b. Scrotum
 c. Fingers d. Muscles
63. All are features of Fournier's gangrene except: (MAHE 2007)
 a. Testicles are involved
 b. Obliterative arteritis seen
 c. Hemolytic streptococci, isolated
 d. Necrotizing fascitis
64. All are features of Fournier's gangrene except: (MAHE 2008)
 a. Testicles are involved b. Obliterative arteritis seen
 c. Hemolytic streptococci d. Necrotizing fasciitis
 e. E. coli, staphylococci, Cl. welchii can be isolated
65. Fournier's gangrene is seen in: (MCI Sept 2008)
 a. Scrotum b. Shaft of penis
 c. Base of penis d. Glans penis

TESTICULAR CARCINOMA PREDISPOSING FACTORS

66. Predisposing factor of Testicular germ cell tumor: (PGI Dec 2003)
 a. Cryptorchidism
 b. Testicular feminization syndrome
 c. Klinefelter's syndrome
 d. Radiation e. Trauma
67. Testicular cancer is common in: (All India 91)
 a. Ectopic testis
 b. Undescended abdominal testis
 c. Atrophic testis
 d. Anteverted testis

TESTICULAR CARCINOMA

68. Most radiosensitive testicular tumour is: (MCI March 2008)
 a. Seminoma b. Teratoma
 c. Interstitial tumours d. Lymphoma
69. Most common testicular tumour in 4th decade: (MCI Sept 2008)
 a. Teratoma b. Dermoid
 c. Seminoma d. All of the above
70. Which of the following is false about testicular tumor?
 a. Pure seminoma is more aggressive than non-seminoma
 b. Seminoma is radiosensitive (AIIMS May 2009)
 c. Seminoma can be treated by orchidectomy with radiotherapy
 d. Seminoma spreads commonly through lymphatics
71. A patient presented with a hard swelling in this right testis. All are true statements except: (AIIMS Nov 2001)
 a. Trans scrotal biopsy is needed
 b. Inguinal exploration is done
 c. High inguinal exploration should be done
 d. Scrotal USG is done
72. Germ cell tumors of testis are: (PGI June 2001)
 a. Seminoma
 b. Teratoma
 c. Leydig cell tumour
 d. Gynandroblastoma
 e. Rhabdomyoma
73. Most common testicular tumor in prepubertal adults is: (AIIMS May 2008)
 a. Yolk sac tumor b. Embryonal cell Ca
 c. Seminoma d. Teratoma
74. Intratubular germ cell tumor found adjacent to: (PGI May, Dec 2006)
 a. Spermatocytic seminoma
 b. Dysgerminoma
 c. Yolk sac tumor
 d. Embryonal carcinoma
 e. Choriocarcinoma
75. Which of the following is not seen in testicular carcinoma? (APPG 2006)
 a. Abdominal lump
 b. Epididymo-orchitis
 c. Inguinal lymphadenopathy
 d. Hydrocele
76. All of the following clinicopathologic features are seen more often in seminomas as compared to non-seminomatous germ cell tumors of the testis except: (AIIMS May 2005, Nov 2004)
 a. Tumors remain localized to testis for a long time
 b. They are radiosensitive
 c. They metastasize predominantly by lymphatics
 d. They are often associated with raised levels of serum AFP and HCG
77. Following statements are true about germ cell tumors of testis except: (AIIMS Nov 2002)
 a. They constitute 90–95% of all primary testicular tumors
 b. Seminoma is the most common tumor developing in the patients with cryptorchid testis
 c. AFP is markedly raised in all germ cell tumors
 d. High inguinal orchidectomy is the initial surgical procedure
78. Testicular tumor with best prognosis is: (PGI Dec 96)
 a. Teratoma b. Seminoma
 c. Choriocarcinoma d. All of the above
79. Marker for testicular tumor is: (AIIMS June 97, PGI June 95)
 a. Beta-hCG b. Acid phosphatase
 c. Alkaline phosphatase d. Alpha-fetoprotein
80. A testicular tumor in a man aged 60-years is; most likely to be: (All India 2001)
 a. Germ cell tumor b. Sertoli cell tumor
 c. Teratocarcinoma d. Lymphoma
81. Shyam, a 50-years old male presents with a hard scrotal swelling. All of the following can be done except: (AIIMS June 2001)
 a. Testicular biopsy b. Chest X-ray
 c. Inguinal exploration d. CT abdomen
82. Regarding testicular tumour, the following are false except: (AIIMS June 2003)
 a. They are commonest malignancy in older man
 b. Seminomas are radiosensitive
 c. Only 25% of stage I teratomas are cured by surgery alone
 d. Chemotherapy rarely produces a cure in those with metastatic disease
83. Placental alkaline phosphatase is marker of: (PGI Dec 99)
 a. Theca cell tumour b. Teratoma
 c. Choriocarcinoma d. Seminoma
84. Tumor marker for seminoma: (AIIMS Nov 2013)
 a. PLAP b. LDH
 c. AFP d. hCG
85. What % of testicular carcinoma is associated with cryptorchidism? (PGI Dec 98)
 a. 10% b. 30%
 c. 70% d. 90%

86. Which of the following statements is true regarding testicular tumors? (All India 2006)

- a. Are embryonal cell carcinomas in 95% of cases
- b. Bilateral in upto 10% cases
- c. Teratomas are more common than seminomas
- d. Usually present after 50-years of age

87. Which of the following is true about seminoma?

- a. It is radiosensitive (PGI Dec 2005)
- b. It arises only from cryptorchid testis
- c. AFP is increased
- d. It is chemosensitive

88. Testicular teratoma in adults is: (DNB 2011)

- a. Benign
- b. Malignant
- c. Locally aggressive
- d. Border line

89. It is true about seminoma testis that: (AIIMS 85)

- a. It commonly occurs in the 6th decade
- b. An undescended testis is more liable to develop this tumour
- c. Histologically it resembles dysgerminoma of the ovary
- d. It is radioresistant

90. Seminoma testis is seen: (Assam 96)

- a. Always in undescended testis
- b. Always bilateral
- c. Occurs in younger
- d. Occurs in elderly

91. Testis tumor is associated with secondary hydrocele in:

- a. 1% of cases
- b. 10% of cases (Karnataka 95)
- c. 20% of cases
- d. 30% of cases

92. Most common testicular tumor in prepubertal adults is:

- a. Yolk sac tumor
- b. Embryonal cell Ca (AIIMS May 2008)
- c. Seminoma
- d. Teratoma

93. Carcinoma testis, the lymphatic metastasis goes to the first site seen in: (UPPG 2010)

- a. Para-aortic lymph nodes
- b. Superficial inguinal nodes
- c. Deep inguinal nodes
- d. Internal iliac nodes

94. A 25-years old man presents with hydrocele on the left side. Associated condition could be a:

- a. Nephroma
- b. Hepatic malignancy
- c. Testicular tumour
- d. Penile malignancy

95. All are true regarding seminoma except: (UPPG 2009)

- a. Common in age between 35 and 45 years
- b. Metastasis to lymphatics
- c. Radioresistant
- d. Not seen before puberty

96. Seminoma of testis has all the following tumour markers except: (COMEDK 2006)

- a. AFP
- b. hCG
- c. LDH
- d. Alkaline phosphate

97. Most malignant testicular tumour is: (DNB 2004)

- a. Seminoma
- b. Teratoma
- c. Choriocarcinoma
- d. Embryonal carcinoma

98. A 20-years old male presents with scrotal mass. The first investigation to be done is:

- a. Clinical evaluation (Palpation and transillumination) (Recent Question 2014; JIPMER 2011)
- b. USG

- c. Biopsy
- d. AFP

99. Most radiosensitive testicular tumor is:

(UPSC 2005, MHPGMCET 2002)

- a. Seminoma
- b. Teratoma
- c. Lymphoma
- d. Sertoli cell tumor

100. Testicular tumor, that is rare in childhood:

(MHPGMCET 2006)

- a. Seminoma
- b. Teratoma
- c. Interstitial cell tumor
- d. None

101. Testicular tumor can simulate:

(PGI SS June 2004)

- a. Hydrocele
- b. Hematocele
- c. Acute epididymoorchitis
- d. Chronic orchitis

102. A 12-year old boy presents with serotal mass. The next best things to do in this patient is: (JIPMER 2011)

- a. Clinical evaluation
- b. USG
- c. Biopsy
- d. Immenate surgery

TESTICULAR CARCINOMA STAGING

103. High inguinal orchidectomy specimen showed tumor testis with involvement of epididymis without vascular invasion; stage is: (MAHE 2007)

- a. T1
- b. T2
- c. T3
- d. T4

104. High inguinal orchidectomy specimen showed teratoma testis with involvement of epididymis; stage is: (DNB 2011, MAHE 2008)

- a. T1
- b. T2
- c. T3
- d. T4b

TESTICULAR CARCINOMA TREATMENT

105. Stage I seminoma testis, treatment of choice is:

- a. High inguinal orchidectomy (AIIMS Nov 2001)
- b. High inguinal orchidectomy and radiotherapy
- c. Radiotherapy and chemotherapy
- d. Trans-scrotal orchidectomy

106. The treatment of metastatic testicular carcinoma is:

- a. Bleomycin, Etoposide, Cisplatin (PGI June 99)
- b. Vinblastine, Etoposide, Cisplatin
- c. Doxorubicin, 5-FU, mercaptopurine
- d. Methotrexate, 5-FU, Vincristine

107. A 27-years old man presents with a left testicular tumor with a 10 cm retroperitoneal lymph node mass. The treatment of choice is: (All India 2003)

- a. Radiotherapy
- b. Immunotherapy with interferon and interleukins
- c. Left high inguinal orchidectomy plus chemotherapy
- d. Chemotherapy alone

108. Treatment of extragonadal germ cell tumour is: (All India 99)

- a. Chemotherapy
- b. Radiotherapy
- c. Surgery
- d. Immunotherapy

109. Which one of the following is the treatment of choice for a 4 cm retroperitoneal lymph node mass in a patient with non seminomatous germ cell tumor of the testis? (AIIMS Nov 2004)

- Radical radiotherapy alone
- High orchidectomy + RPLND
- RPLND alone
- High orchidectomy alone

110. A patient comes with stage III non seminomatous testicular tumor, treatment of choice is: (AIIMS June 97)

- Radiotherapy
- Chemotherapy
- Hormonal therapy
- Surgery

111. Disseminated seminoma is treated by: (PGI 88)

- Chemotherapy or radiotherapy and orchidectomy
- Only radiotherapy
- Only chemotherapy
- RPLND

112. Stage-II testicular teratoma is treated by:

- Orchidectomy + RPLND (DNB 2008, 2005, AMU 05)
- Orchidectomy + Chemotherapy
- Orchidectomy
- Radiotherapy

113. Treatment of stage I teratoma is: (MCI Sept 2008)

- Chemotherapy
- Radiotherapy
- Chemotherapy plus Radiotherapy
- Observation /RPLND

114. Which of the following is a known complication of modified RPLND (Retroperitoneal lymph node dissection) done for non-seminomatous germ cell tumor of testis? (MHSSMCET 2005)

- Impotence
- Bladder atony
- Dry ejaculation
- Retrograde ejaculation

115. Which of the following testicular tumor does not require RPLND? (MHSSMCET 2005)

- Germ cell tumor
- Embryonal cell tumor
- Seminoma
- Teratoma

116. Treatment of Non-seminomatous germ cell tumor of testis with more than 4 cm RPLN includes: (PGI May 2011)

- RPLND
- Inguinal orchidectomy
- Chemotherapy
- Radiotherapy
- Orchidectomy through mid testicular incision

SEX CORD / GONADAL STROMAL TUMORS

117. Not true of sertoli cell tumour: (Punjab 2009)

- Poor response to radiotherapy
- Prominent lymphocytes in section
- Common in adults
- Can be malignant in 10–20% of cases

CARCINOMA SCROTUM

118. The lymph nodes first involved in cancer of the skin of the scrotum are: (Karnataka 96)

- Superficial inguinal
- External iliac
- Para aortic
- Gland of Cloquet

ORCHIDECTOMY

119. Subcapsular orchiectomy is done for cancer of:

(DNB 2008, APPG 96)

- Testis
- Prostate
- Penis
- Urethra

120. Ligation of cord in orchidectomy for treatment of testicular tumor is done at: (PGI 96)

- External ring
- Internal ring
- Base of scrotum
- Just above epididymis

121. Subcapsular orchidectomy is done for cancer of: (DPG 2005)

- Testis
- Prostate
- Penis
- Male breast cancer

122. Orchidectomy is not done in: (AIIMS June 2001)

- Prostate cancer
- Seminoma testes
- Filarial epididymo-orchitis
- Male breast cancer

123. Orchiectomy is not indicated in: (AIIMS Nov 99)

- Seminoma testis
- Prostatic carcinoma
- Tubercular epididymitis
- Male breast cancer

MISCELLANEOUS

124. Dermoid arises from: (PGI June 97)

- Pluripotent cell
- Totipotent cell
- Ectoderm
- Mesoderm

125. Differential diagnosis of acute funiculitis with a small inguinal swelling is: (TN 91)

- Undescended testes
- Acute orchitis
- Lymphadenitis
- Small strangulated inguinal hernia

126. Which of the following closely mimics testicular malignancy? (JIPMER 81, DPG 79, 93)

- Hydrocele
- Hematocele
- Spermatocele
- Cyst of epididymis

127. The life of preserved semen for artificial insemination is:

(PGI 82, DNB 90)

- One year
- Two years
- Five years
- Ten years
- Fifty years

128. Best indication for testicular biopsy in a male is:

(Bihar PG 2014; All India 97)

- Polyspermia
- Oligospermia
- Necrospermia
- Azoospermia

129. Which of the following structure in the spermatic cord is not damaged during vasectomy? (AIIMS Nov 2012)

- Testicular artery
- Ilioinguinal nerve
- Autonomic nerves
- Pampiniform plexus

130. Young male with history of trauma having left sided testis swollen and erythematous. Other side normal. Diagnosis:

(Recent Questions 2013)

- Torsion
- Carcinoma
- Hematoma
- Hernia

EXPLANATIONS

UNDESCENDED TESTIS

1. Ans. b. 6 months of age (Ref: Smith 17/e p25, 690, 704; Campbell 10/e p3560-3574; Bailey 26/e p1377-1379, 25/e p1377-1379)

UNDESCENDED TESTIS

- UDT affects 3% of **full-term**^Q newborns.
- **Incidence** by 1 year of age is 1%.
- Approximately 70% to 77% of UDT will **spontaneously descend**, usually by 3 months^Q of age.

- **Birth weight**^Q may be the **principal determinant** of UDT at birth and at 1 year of life, **independent** of the **length of gestation**.

- In UDT, 80% are **palpable** and 20% are **nonpalpable**^Q.
- **MC location** for an ectopic UDT is within the **superficial pouch**^Q.

Pathology

- The **germ cell histology** of both the testes is **abnormal**.

The histopathologic hallmarks of UDT are evident between 1-2 years^Q of age:

- **Decreased numbers of Leydig cells** (Earliest abnormality)^Q
- **Degeneration of Sertoli cells**^Q
- **Delayed disappearance of gonocytes**^Q
- **Delayed appearance of adult dark spermatogonia**^Q
- Failure of primary spermatocytes to develop^Q
- **Reduced total germ cell counts**^Q

- **Hypoplasia of the Leydig cells**, observed from the 1st month^Q of life, is the **earliest postnatal histologic abnormality**^Q in UDT.
- Adverse effects on **contralateral testes**: Autoantibodies against UDT causes **degenerative changes** in contralateral testis, **germ cell histology** is **abnormal** and **risk of carcinoma**^Q is also increased.

Associated Anomalies

- **Epididymal anomalies** and **patent processus vaginalis** up to 90%^Q cases of UDT.
- **Renal Anomalies** in 10% cases (Renal hypoplasia, agenesis, horse shoe kidney, PUJ obstruction)
- **Hypospadias**

Hazards: (SATHI- Sterility, Atrophy, Trauma, Tumor, Torsion, Hernia, Inflammation)

Neoplasia

- Relative risk of testicular tumor is increased **17 times**.
- MC tumor that develops is **seminoma**^Q.
- **Higher the testis, greater the risk**^Q (Abdominal testis has higher risk than inguinal)
- **Orchiopexy doesn't decrease the risk, it helps in early detection only**^Q.

Infertility

- **Histopathological changes** start at 1 year^Q.
- At 6-8 years, **spermatogenesis** is **absent**^Q.
- **Endocrine functions** are **retained** as the **Leydig cells** are **less sensitive to temperature**^Q.
- Surgical repositioning before the onset of histopathological changes decreases the risk of subfertility.
- **Paternity** is significantly **compromised** in men with **bilateral**, but not unilateral UDT.

- **Hernia: Patent processus vaginalis**^Q is seen in 90% cases of UDT.
- **Torsion**: Increased susceptibility

Diagnosis

- **Inguinal exploration** is **IOC** for UDT^Q.

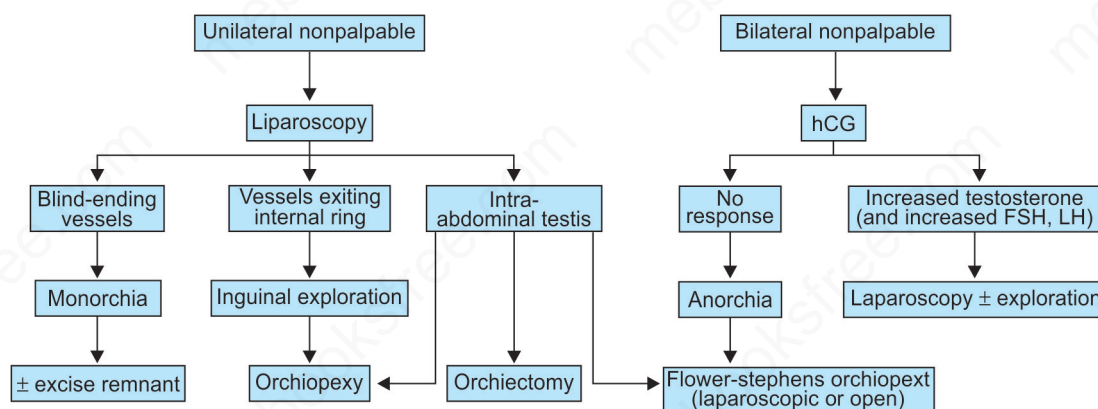
Diagnostic Laparoscopy

- IOC for 'non-palpable' UDT^Q.
- MC application of laparoscopy in children is for UDT.
- **Accuracy** of transperitoneal laparoscopy in locating a non-palpable testis is **100%**^Q and it subsequently defines the management options.
- **Vas and testicular artery** is traced in pelvis.
- **Blind ended vas doesn't conclude the absence of testis^Q**, whereas **blind ended testicular artery is a definitive investigation for an absence of testis^Q**.
- Laparoscopy is also useful in lap. assisted orchiopexy.

Management: Orchiopexy, **Ideal time:** 6-12 months^Q of age. (Best time is 6 months^Q)

Types of Orchiopexy

- | | |
|--|---|
| 1. Fowler-Stephens orchiopexy ^Q | 4. Ombridann's orchiopexy ^Q |
| 2. Microvascular testicular autotransplantation (Best results) ^Q | 5. Placing testis in Dartos pouch ^Q |
| 3. Ladd and Gross orchiopexy ^Q | 6. Keetley-Torek orchiopexy ^Q |



2. Ans. a. 6 months (Ref: Sabiston 18/e p2071; Abdominal wall Hernias- Principle and Management: Springer 2001/176)

TIMING OF ORCHIOPEXY IN UDT

Sabiston 18/e p2071

- In most pediatric centers, orchiopexy for unilateral UDT is done when patient have reached about **6 months** of age^Q. This **early intervention** may permit **post-natal germ cell development to proceed normally^Q**.

Abdominal wall Hernias- Principle and Management: Springer 2001/176

- In infants with congenital UDT, still undescended after 12 weeks of age, orchiopexy is recommended at **6 months** of age **before germ cell development becomes deranged^Q**.
- Achieve **scrotal placement** ideally by **6 months** of age and by **1 year** of age **at the latest^Q**.

3. Ans. a. 3% 4. Ans. a. Seminoma 5. Ans. b. Undescended testis
6. Ans. a. Testicular tumor
7. Ans. c. Laparoscopy (Ref: Smith 17/e p25, 690, 704; Oxford Handbook of Urology 2/e p618-620; Campbell 10/e p3560-3574; Bailey 26/e p111)
- Diagnostic laparoscopy is a definitive investigation for an absence of testis (anorchia).*
- "Impalpable undescended testes are either absent or located in the abdomen or inguinal canal. There is no benefit from imaging and these are best managed with a laparoscopy and usually a staged approach." - Bailey 26/e p111*
8. Ans. a. Infancy 9. Ans. a. Hydrocele
10. Ans. a. Right side 11. Ans. a. Orchiopexy
12. Ans. c. Has higher incidence of malignancy
13. Ans. c. Poorly developed secondary sexual characters
14. Ans. b. 4 months

ECTOPIC TESTIS

15. Ans. a. Superficial inguinal pouch (Ref: Smith 17/e p25; Bailey 26/e p1379, 25/e p1379)

ECTOPIC TESTIS

- An ectopic testicle **descends normally through the inguinal canal** but then **moves into an abnormal position** in the groin area^Q.
- An **ectopic testis** is usually **fully developed**^Q. The main hazard is **liability to injury**^Q.

Locations of Ectopic Testis

- Superficial inguinal pouch (MC location)**^Q
- Femoral canal**^Q (the inner portion of the thigh near the groin)
- Perineum**^Q (below the scrotum)
- Suprapubic region**^Q (above the penis)
- Contralateral scrotum (Least common)**^Q

Embryology

- Ectopic testis are likely related to **abnormalities of the gubernaculum**^Q, which is a fibrous, cord-like membrane that runs through the inguinal canal from the abdomen to the scrotum.
- The **gubernaculum helps to guide the descent** of the **testicles**^Q and has branches that attach to these other locations.
- Ectopic testicles usually will not descend into the normal position in the scrotum on their own.
- Most ectopic testicles can be felt (are palpable)**^Q.

Treatment

- Surgical treatment** to place an ectopic testicle in its normal position any time **after about age 6 months** but **no later than 2 years of age**^Q.

16. Ans. a. Lumbar, c. Intraabdominal

17. Ans. d. All

TESTICULAR TORSION

18. Ans. b. Commonly associated with pyuria (Ref: Smith 17/e p704; Campbell 10/e p67, 3587-3594; Bailey 26/e p1379-1380, 25/e p1379-1380)

TESTICULAR TORSION

- Twisting of testis on the spermatic cord, resulting in strangulation of the blood supply and infarction of testis.
- Types of testicular torsion: Intravaginal and Extravaginal.

INTRAVAGINAL TESTICULAR TORSION

- Torsion** occurs **within the space of tunica vaginalis**, which is **highly invested**^Q, resulting in lack of normal fixation of the testis and epididymis to the fascial and muscular coverings (scrotal parietal wall)
- MC age group** affected is **10-25 years**, with peak in **prepubertal age**^Q
- Cremaster fibers** have a **spiral attachment over the cord**, it favors rotation **when cremaster reflex is strong**^Q.

Predisposing Factors

- Inversion of the testis** (testis lies transversely or upside down) is **MC predisposing factor**^Q
- High investment of tunica vaginalis** causes the testis to **hang within the tunica** like a **clapper in a bell**^Q
- Separation of the epididymis from the body of testis**^Q permit torsion of testis without involving cord

Clinical Features

- Sudden agonizing scrotal pain** with **nausea or vomiting**^Q
- Dysuria** or other **bladder symptoms** are usually **absent**^Q
- Affected testis **high-riding in scrotum**, may have **abnormal transverse orientation**^Q
- Cord** is usually **thickened**^Q

- Absent cremasteric reflex**^Q is **highly suggestive** of torsion testis (**present in epididymitis**)

- After several hours massive scrotal edema may obliterate all the findings
- Prehn's sign** is **negative**^Q (On elevation of testis, pain relieved in epididymoorchitis but not in torsion testis)

Imaging

- Color Doppler** detects the **decreased blood flow** to the testis in torsion and is **investigation of choice**^Q to exclude torsion from epididymoorchitis.

- Tc99 pertechnetate scan demonstrate **poor radionuclide tracer uptake**^Q

Treatment

- Testicular torsion is **urological emergency** as ischemic injury occurs as soon as **4 hours**^Q after occlusion of the cord.

- **Immediate surgical exploration**^Q is indicated if testicular torsion is suspected because if treated within first 4 hours, the chances of testicular salvage are high.

- Even if manual detorsion is done, it may not totally correct the rotation and prompt exploration is still indicated.
- Viable as well as testis of marginal viability are preserved, and **orchiopexy** is done either by **placing into dartos pouch without suture fixation** or **suture fixation of tunica albuginea with the parietal wall**^Q.

- **Exploration of contralateral hemiscrotum** must be carried. In almost all cases, a **bell clapper deformity** is found.
- **Contralateral testis** must be **fixed to prevent subsequent torsion**^Q.

- **Risk of autoimmunization** against own sperms is **low in children <10 years**, because there is no blood testis barrier and spermatogenesis is dormant.
- Current recommendation is **preserve a compromised testis in children <10 years**, proceed with orchidectomy in older children.

EXTRAVAGINAL TESTICULAR TORSION

- There is **no anatomical defect**^Q
- Occurs in **perinatal period**, as there is **no testicular fixation**^Q (adherence of tunica vaginalis to the dartos layer) by that time, and as a result the spermatic cord and tunica vaginalis **rotate as one unit**^Q

Prenatal torsion	Postnatal torsion
<ul style="list-style-type: none"> • A hard non-tender testis at birth, fixed to the overlying skin^Q • Salvage rate is nil^Q • Contralateral scrotal exploration is not recommended^Q as it is not associated with a testicular fixation defect 	<ul style="list-style-type: none"> • Swelling and tenderness of scrotum, usually no fixation^Q of the skin • Prompt surgical exploration is indicated • Exploration of contralateral testis should be done as 20% cases are associated with bell clapper deformity^Q

19. Ans. d. If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery after 14 days
20. Ans. b. Low investment of tunica vaginalis
21. Ans. c. Elevation of testis reduces the pain
22. Ans. c. Torsion of testis
23. Ans. a. Immediately
24. Ans. a. 6 hours
25. Ans. c. Anatomical abnormality is unilateral and contralateral testis should not be fixed

VARICOCELE

26. Ans. a. Common on the right side (Ref: Smith's Urology 17/e p704-705, 143-144; Campbell's 10/e p3575-3582; Bailey 26/e p1380-1381, 25/e p1380-1381)

VARICOCELE

- Dilated and tortuous veins of pampiniform plexus (veins draining testis and epididymis)^Q lying **posterior and above the testis**
- Most common **surgically correctable cause** of male **subfertility**^Q
- Surgical **correction** can **reverse atrophy** in adolescents^Q

Etiology

- **Absent or incompetent valves** in the internal spermatic or **left testicular vein (MC)**^Q and it joins left renal vein at right angles.
- Increased venous pressure in left renal vein (**Nutcracker phenomenon**^Q - caused by compression of left renal vein between aorta and superior mesenteric artery)
- Collateral venous anastomosis
- Compression by sigmoid colon

Clinical Features

- MC seen in **young adults**^Q, **tall thin men**^Q are frequently affected
- **Painless**, compressible mass lying **posterior and above the testis**
- **Bag of worms** like feel on on palpation in standing position^Q
- Marked **left side predominance**^Q (90%)
- Varicocele **do not regress spontaneously**^Q, associated with testicular atrophy

- **Suspicious varicoceles:** May be **secondary to RCC**, as growth from renal cell carcinoma **blocks the renal vein by venous permeation**. In RCC, varicocele **doesn't decompress in supine position**^Q.
 - **Right sided** varicoceles^Q
 - **Rapidly evolving** varicoceles^Q
 - Varicoceles in **elderly**^Q
 - Varicocele that **doesn't decompress** in supine position^Q

Varicocele Classification	
Subclinical	Not palpable or visible at rest or during Valsalva maneuver, but demonstrable by special tests ^Q (reflux found on doppler examination)
Grade 1	Palpable during Valsalva ^Q maneuver, but not otherwise
Grade 2	Palpable at rest ^Q , but not visible
Grade 3	Visible ^Q and palpable at rest

Effect on Spermatogenesis

- Varicocele **increases the temperature of scrotum**^Q and this decreases spermatogenesis
- Infertility is observed in higher percentage of individuals.
- Abnormal semen analysis (**decreased sperm motility and number**), normalizes after surgery.
- Improvement in semen quality is seen in upto 65% after varicocele ligation.

Diagnosis

- Diagnosis is made by **clinical examination** and **confirmed by color Doppler analysis** (reflux/reverse flow is characteristic of varicoceles)^Q.
- **Venography:** **most accurate** method of varicocele diagnosis, done for varicocele in the **post surgical patients**^Q.

Indications for surgery	
1. Infertility ^Q	4. Significant discomfort
2. Poor testicular growth in adolescents ^Q	5. Recruitment to police or armed forces
3. Defective sperm count or motility ^Q	

Treatment

- **Ligation of testicular vein above the inguinal ligament**^Q where the pampiniform plexus has coalesced into one or two vessels. (Venous drainage after ligation is by **cremasteric veins**^Q)

- **Best surgical option is microscopic subinguinal ligation**^Q.

- Other procedures are open inguinal/subinguinal, laparoscopic or retroperitoneal (**Palomas**^Q) ligation or embolization.
- **Complications of surgery:**
 - Postoperative hydrocele formation (least with **microscopic ligation** and **embolization**)
 - **Testicular atrophy**^Q (seen in <1% due to damage of testicular artery).

27. Ans. b. Left testicular vein drains into left renal vein which has high pressure
28. Ans. a. Above inguinal ligament 29. Ans. b. More common on the right side
30. Ans. d. CA kidney 31. Ans. d. Frequently on right side
32. Ans. a. Varicocele 33. Ans. c. Asymptomatic cases require surgery
34. Ans. a. Varicosity of cremasteric veins 35. Ans. a. Cremasteric veins
36. Ans. b. Can cause oligospermia 37. Ans. a. Varicocele
38. Ans. a. More common on right side
39. Ans. a. Ipsilateral testis small size, b. Oligospermia on semen analysis, d. Signs or symptoms present
40. Ans. a. Varicocele

SPERMATOCELE

41. Ans. a. Occurs in head of epididymis, b. Barely water fluid in appearance, d. Contain spermatozoa (Ref: Bailey 26/e p1383, 25/e p1383)

SPERMATOCELE

- Unilocular retention cyst derived from some portion of the **sperm-conducting mechanism** of the **epididymis**^Q.

Clinical Features

- Typically lies in the **epididymal head**, above and behind the **upper pole** of the testis.

- Usually small and unobtrusive^Q.
- Usually softer and laxer than other cystic lesions in the scrotum but, like them, it transilluminates^Q.
- The fluid contains spermatozoa^Q and resembles barley water in appearance^Q.

Treatment

- Small spermatoceles can be ignored.
- Larger ones should be aspirated or excised through a scrotal incision.

- Chinese-Lantern pattern on transillumination is more commonly seen in epididymal cyst.

42. Ans. b. Epididymal cyst

43. Ans. c. Tender

HYDROCELE

44. Ans. a. Limited to scrotum (Ref: Campbell 10/e p3582-3586; Bailey 26/e p1382, 25/e p1381-1382)

HYDROCELE

An accumulation of fluid in layers of tunica vaginalis

Types:

- **Vaginal hydrocele (MC)**^Q
 - Abnormal accumulation of serous fluid within the tunica vaginalis.
- **Infantile hydrocele:**
 - Does not necessarily appear in infants.
 - The tunica and processus vaginalis are distended to the inguinal ring **without any connection** with peritoneal cavity^Q.
- **Congenital hydrocele** (Communicating hydrocele):
 - **Patent processus vaginalis**^Q allows peritoneal fluid to freely communicate.
 - Size of hydrocele fluctuates, usually related to activity
 - Congenital hernia has the same defect. UDT are commonly associated.
 - **Wait for 2 years for spontaneous closure**^Q. Otherwise the treatment is **herniotomy**^Q.
- **Funicular hydrocele:**
 - Processus vaginalis remains **patent upto the top** of the **testis**^Q, where it is shut off from the tunica vaginalis.
- **Hydrocele En bisac or Bilocular hydrocele:**
 - Hydrocele has **2 intercommunicating sacs**, one **above** and one **below the neck**^Q of the scrotum.
 - The upper sac has **no connection with the processus vaginalis**^Q and it is in fact the herniated tunica vaginalis.
- **Hydrocele of the cord:**
 - **Central portion** of the **processus vaginalis** is **patent**^Q, but its upper and lower parts are obliterated.
 - Presents as **painless groin mass** contiguous with cord structures, moves downward and becomes less mobile if testis is pulled gently downwards.
- **Hydrocele of the canal of Nuck:**
 - Female counterpart of Hydrocele of the cord. It is seen in relation to the round ligament. (Ref: Smith 17/e p211; Campbell 10/e p3583; Bailey 26/e p1382, 25/e p1383)

Secondary Hydrocele

- **Causes** are acute or chronic **epididymo-orchitis (MC)**^Q, testicular tumors, torsion of testis
- Usually **lax** and of **small size** with **palpable underlying testis**^Q
- Subsides with resolution of epididymo-orchitis

45. Ans. c. Herniotomy

46. Ans. a. Patent processus vaginalis

47. Ans. d. Herniotomy

48. Ans. c. Testis is separate from swelling

49. Ans. d. Hydrocele (Ref: Campbell 10/e p1009-1011; Bailey 26/e p1382, 25/e p1382)

Treatment of Vaginal hydrocele

1. **Small hydrocele:** **Lord's procedure (Plication of sac)**^Q
2. **Medium hydrocele:** **Jaboulay's procedure (Eversion of sac)**^Q
3. **Large hydrocele:** **Excision of sac**^Q

50. Ans. c. Hydrocele

51. Ans. c. Surgery

EPIDIDYMO-ORCHITIS

52. Ans. c. *Chlamydia trachomatis* (Ref: *Smith's Urology* 17/e p210-212, 704; *Campbell's* 10/e p3117-3118; *Bailey* 26/e p1384, 25/e p1383-1384)

ACUTE EPIDIDYMOORCHITIS

- Inflammation of the **epididymis** and **testis**, from an **ascending infection**^Q from the lower urinary tract.
- Initially epididymis is involved, after that there is involvement of testis.
- Most cases of epididymitis in **men younger than 35 years** are due to **sexually transmitted organisms** [*C. trachomatis* (MC)^Q and *N. gonorrhoe*]
- In **children** and **older men** are due to **urinary pathogens** such as *E. coli*^Q.
- In **homosexual men**, *E. coli*^Q and other coliform bacteria are common causative organisms.

Clinical Features

- Patient presents with **fever, swollen, red and tender scrotum**^Q.
- The epididymis and testis are swollen (**Thickened cord** with **reactive hydrocele**)^Q
- Symptoms of **urethritis, cystitis or prostatitis**^Q
- Urine analysis typically demonstrates **WBCs and bacteria** in the **urine or urethral discharge**^Q

Diagnosis

- Scrotal USG showing enlarged epididymis with increased blood flow with reactive hydrocele.
- **Prepubertal children** diagnosed with epididymitis **require radiologic investigation** for **urinary tract anomalies** such as reflux or ureteral Ectopia^Q.

Treatment

- Antibiotics, rest, scrotal elevation and NSAIDs^Q.

- MC organism causing epididymoorchitis in <35 and sexually active males: *Chlamydia*^Q
- MC organism causing epididymoorchitis in children, elderly, homosexuals: *E. coli*^Q

53. Ans. b. Elevation of testes reduces pain of epididymitis

54. Ans. b. Epididymis

55. Ans. a. Associated with urinary infection

56. Ans. a. The patient should be prescribed antibiotics and asked to come after a week

57. Ans. c. Syphilis

58. Ans. b. Elevation of testis in epididymoorchitis relieves pain (Ref: *Smith's Urology* 17/e p210-212, 704; *Campbell's* 10/e p3117-3118; *Bailey* 26/e p1384, 25/e p1383-1384)

Testicular torsion	Epididymoorchitis
<ul style="list-style-type: none"> • Seen in prepubertal age group (10-25)^Q • Urine culture is sterile • No fever, sudden agonizing pain^Q with affected testis high-riding^Q in scrotum • Cremasteric reflex is absent^Q • Prehn's sign is negative^Q • Color Doppler: Decreased blood flow^Q • Treatment: Immediate surgical exploration^Q 	<ul style="list-style-type: none"> • Adults, age group 20-30^Q • Evidence of UTI • Fever, swollen, red and tender scrotum, thickened cord with reactive hydrocele^Q • Cremasteric reflex is present^Q • Prehn's sign is positive^Q • Scrotal USG: Enlarged epididymis with increased blood flow with reactive hydrocele^Q. • Treatment: Antibiotics, rest, scrotal elevation and NSAIDs^Q.

59. Ans. b. Decreased blood flow

60. Ans. a. Acute orchitis

61. Ans. d. Occurs in young sexually active men and is commonly due to *C. trachomatis*

FOURNIER'S GANGRENE

62. Ans. b. Scrotum (Ref: *Campbell* 10/e p324-325; *Bailey* 26/e p1388, 25/e p1387-1388)

FOURNIER'S GANGRENE (IDIOPATHIC SCROTAL GANGRENE)

- A form of **necrotizing fasciitis**, with **abrupt onset** of a **rapidly fulminating genital gangrene** of idiopathic origin and **gangrene upto deep fascia**^Q.

Predisposing Factors

- | | |
|---|---|
| <ul style="list-style-type: none"> • Diabetes mellitus (MC) • Local trauma • Paraphimosis | <ul style="list-style-type: none"> • Anal infections • Immunosuppression^Q |
|---|---|

- **Multiple organisms (aerobes + anaerobes)^Q** results in fulminating inflammation of the subcutaneous tissues which results in **obliterative arteritis** of arterioles of the scrotal skin. (**Polymicrobial**)^Q

Clinical Features

- History of **recent perineal trauma, instrumentation, urethral stricture** or a **rectal source** of infection is frequently present^Q.
- Infection commonly starts as cellulitis. Involved area swollen, erythematous and tender as the infection begins to involve the deep fascia.

- | |
|---|
| <ul style="list-style-type: none"> • Areas of purplish and blackish discoloration, dishwater like discharge, fetid odour and skin necrosis. • Pain is predominant with fever and marked systemic toxicity^Q. Crepitus is present^Q. |
|---|

- Skin, superficial fascia, deep fascia is destroyed, while **corpora cavernosa, urethra, testis, cord structures** are **preserved^Q**.

Management

- **Prompt diagnosis and aggressive treatment^Q** is the initial treatment to limit the spread.

- | |
|---|
| <ul style="list-style-type: none"> • I.V. hydration, antibiotics, surgical debridement of the necrotic fat and fascia^Q • Mortality without treatment: 7-75%^Q (Average-20%) |
|---|

- **Surgical debridement** is cornerstone, **serial debridement^Q** is usually required.
- **Orchidectomy is almost never required^Q**, because the testis have their blood supply independent of the compromised fascial and cutaneous circulation of the scrotum.

63. Ans. a. Testicles are involved 64. Ans. a. Testicles are involved 65. Ans. a. Scrotum

TESTICULAR CARCINOMA PREDISPOSING FACTORS

66. Ans. a. Cryptorchidism, b. Testicular feminization syndrome, c. Klinefelter's syndrome (Ref: Smith 17/e p375; Campbell 10/e p3725; Bailey 26/e p1385, 25/e p1385)

PREDISPOSING FACTORS FOR TESTICULAR GCTs

- **Cryptorchidism**
 - Of the predisposing factors, **cryptorchidism** has the **strongest association** with the **testicular carcinoma^Q**.
 - **Higher the testis, greater the risk^Q**. Abdominal cryptorchid testis is at higher risk than inguinal cryptorchid testis.
- | |
|--|
| <ul style="list-style-type: none"> • Increased risk is seen in both the testis (cryptorchid and normally descended testis)^Q • MC tumour seen: Seminoma > Embryonal cell carcinoma |
|--|
- **Orchidopexy doesn't decrease the risk of malignancy^Q**, however it facilitates examination and tumour detection.
 - **Testicular feminization syndrome**
 - **GCT of one testis** for other testis
 - **Testicular carcinoma in sibling**
 - **Klinefelter's syndrome** (increases risk of both **testicular** and **mediastinal GCT**) and **male CA breast^Q**.
 - **Administration of DES (estrogen)** in utero

67. Ans. b. Undescended abdominal testis

TESTICULAR CARCINOMA

68. Ans. a. Seminoma (Ref: Smith's Urology 17/e p375-383; Campbell's 10/e p838; Bailey 26/e p1385-1386; CSDT 11/e p1071)

TESTICULAR TUMORS

- **MC histological type** of testicular tumour: **Mixed^Q** (if option is there, otherwise seminoma)

- MC tumour of testis: **Seminoma**^Q
- MC bilateral primary testicular tumour: **Seminoma**^Q
- Most radiosensitive testicular tumor: **Seminoma**^Q

- MC testicular tumor in **infant and children upto 3 years**: **Yolk sac tumour**^Q
- MC testicular tumor in **prepubertal children**: **Teratoma**^Q

- MC testicular tumor in **patients >60 years**: **Lymphoma**^Q
- MC bilateral testicular tumour: **Lymphoma**^Q
- MC secondary testicular tumour: **Lymphoma**^Q

- MC histologic type of testicular lymphoma: **Diffuse histiocytic lymphoma**^Q
- Testicular tumour with **best prognosis**: **Yolk sac tumour**^Q
- Testicular tumour with **worst prognosis**: **Hurricane tumour (Type of choriocarcinoma)**^Q

69. Ans. c. Seminoma

70. Ans. a. Pure seminoma is more aggressive than non-seminoma (Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729; Bailey 26/e p1385-1386, 25/e p1384-1387)

TESTICULAR TUMORS

- MC tumour of testis: **Seminoma**^Q
- MC histological type of testicular tumour: **Mixed**^Q (if option is there, otherwise seminoma)
- Genomic change found in all germ cell tumors is an **isochromosome of short arm of chromosome 12**^Q.

Clinical Features

- MC presentation is a **nodule or painless swelling of one gonad**^Q.
- 10% patients present with acute pain or manifestation due to secondaries like neck or abdominal masses, GI disturbances, respiratory or CNS symptoms, bone pain or lumbar backache due to nerve roots involvement by bulky retroperitoneal disease.
- Secondary hydrocele is also seen in 5-10%^Q cases.

- 5% GCT may present with **gynecomastia**^Q as a systemic endocrine manifestation.
- Gynecomastia is more commonly seen with **sex cord or gonadal stromal tumors (Leydig cell tumor, Sertoli cell tumor, Granulosa/Theca cell tumor)**^Q.

- Majority (2/3rd) of seminoma are **confined to testis**^Q at the time of presentation, whereas majority of **non-seminomatous GCT** have **widespread metastasis** at presentation.
- Many patients would present with a history of trauma, but trauma merely draws the attention of the patients and has no etiological association with tumour.

Bilateral Testicular Tumors

- **Bilateral testicular tumors** are seen in 1-2% cases.
- Primary bilateral testicular tumors have tendency of **same histology on both sides**^Q.
- **Seminoma**^Q is the MC histological finding in bilateral **primary** testicular tumor, whereas **malignant lymphoma** is the MC bilateral testicular tumor^Q.

- Any patient with a **solid firm intratesticular mass** must be considered to have **testicular tumour** unless proved otherwise.

Investigations

- **USG**: Any hypoechoic area within tunica albuginea is markedly suspicious.

- **FNAC** is **Contraindicated** (**Scrotal seedlings** may result in **inguinal LN metastasis**)^Q

- **Histopathological Diagnosis**: **Radical orchiectomy** by inguinal canal approach, the **cord** is ligated at **deep inguinal ring** (high inguinal orchiectomy)^Q.
- **Trans-scrotal Orchidectomy** is **contraindicated** as it permits the development of alternate **lymphatic channel pathway** to **inguinal and pelvic lymph nodes**.

Chevassu maneuver^Q

- First a **soft clamp** is applied to the **cord**, the suspicious area is **biopsied** and sent for the **frozen section**. If malignant, formally ligate the cord and send the orchiectomy sample for final histopathology.

- **CECT abdomen** for evaluation of **retroperitoneum and lymph nodes**^Q.

Spread of Disease

- Germ cell tumors of the testis typically **spread** in a **stepwise lymphatic fashion (MC mode)**^Q.

- The **primary landing site for the right testis** is the **interaortocaval area**^Q at the level of the right renal hilum, and **for the left testis** is the **para-aortic area**^Q at the level of the left renal hilum.
- In the absence of disease on the left side, no crossover metastases to the right side have ever been identified. However, **right-to-left crossover metastases**^Q are common.

- **Retroperitoneum** is the **most commonly involved site**^Q in metastatic disease.
- Most **blood borne metastasis** occurs following LN involvement, **Lung** is **MC organ**^Q involved.
- **Choriocarcinoma** is the exception and characterized by **early hematogenous spread**, especially to the **lung**^Q.

Chemotherapy

- Chemotherapy for **extragonadal GCT**: Combination of **Bleomycin + Etoposide**^Q + **Cisplatin (BEP)**^Q

71. Ans. a. Trans scrotal biopsy is needed

72. Ans. a. Seminoma, b. Teratoma (Ref: Smith's Urology 17/e p375-383; Campbell's 10/e p838; CSDT 11/e p1071)

CLASSIFICATION OF TESTICULAR TUMORS

- **Germ cell tumors:**
 - Seminomas
 - **Non-seminomas:**
 - ❖ Embryonal cell carcinoma
 - ❖ Yolk sac tumour
 - ❖ Teratoma
 - ❖ Choriocarcinoma
- **Sex cord/gonadal stromal tumors:**
 - Leydig cell tumour
 - Granulosa cell tumor
 - Sertoli cell tumor
 - Thecoma/fibroma
- **Tumors containing both germ cell and sex cord/gonadal stromal elements:**
 - Gonadoblastoma
- **Lymphoid and Hematopoietic tumour:**
 - Lymphoma, Leukemia, Plasmacytoma
- **Miscellaneous:**
 - Carcinoid, Adenoma, Carcinoma

73. Ans. d. Teratoma (Ref: Smith 17/e p376; Campbell 10/e p840-842)

- **MC testicular tumour in prepubertal adults: Teratoma**^Q
- **MC testicular tumor of infants and children: Yolk sac tumor**^Q

YOLK SAC TUMOR

- **MC testicular tumor of infants and children**^Q.
- The terms **endodermal sinus tumor**, **adenocarcinoma of the infantile testis**, **juvenile embryonal carcinoma**, and **orchioblastoma** are all used synonymously^Q.

Pathology

- In its pure form, the lesion has a **homogeneous, yellowish, mucinous** appearance^Q.
- **Embryoid bodies**, a common finding in yolk sac tumors, resemble 1- to 2-week-old embryos.

Three most common microscopic patterns

1. **Microcystic- honeycomb appearance**, with **hyaline globules**^Q
2. **Endodermal sinus-** perivascular formations known as **Schiller-Duval bodies**^Q
3. **Solid-** small polygonal cells, clear cytoplasm, frequent mitoses

- The pattern of metastatic disease of yolk sac tumors in childhood differs from the pattern in adult germ cell tumors, owing to a higher incidence of hematogenous spread.

Clinical Features

- **MC testis tumor in prepubertal boys**, presents as **slow-growing scrotal mass** in a young boy^Q
- **Hydrocele** is present in **25%** of cases^Q.

Tumor Marker

- **AFP** is elevated in **>90%**^Q.

74. Ans. b. Dysgerminoma, d. Embryonal carcinoma, e. Choriocarcinoma (Ref: Smith 17/e p377; Campbell 10/e p838-842, 850-851, 9/e p899)

INTRATUBULAR GERM CELL NEOPLASIA (ITGCN) OR TESTICULAR CARCINOMA IN SITU (CIS)

- Preinvasive precursor of all testicular GCTs except:
 - Spermatocytic seminoma^Q
 - Yolk sac tumor^Q
 - Teratoma in children^Q
- Presently, there is **no established tumor marker** for CIS, and **testicular ultrasound** has been shown to be **unreliable** with respect to diagnosing CIS.
- Therefore, **testicular biopsy** remains the “gold standard” for diagnosing CIS^Q.

Risk Factors for ITGCN

<ul style="list-style-type: none"> • History of testicular carcinoma^Q • Extragenadal GCT^Q • Cryptorchidism^Q • Contralateral testis with unilateral testicular cancer^Q 	<ul style="list-style-type: none"> • Atrophic contralateral testis^Q with unilateral testicular cancer • Somatosexual ambiguity^Q • Infertility^Q
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Pathology

- ITGCN cells are located on the **basement membrane** of the **seminiferous tubule** and possess morphologic features of malignancy: **large irregular nucleus, coarse chromatin, and abundant cytoplasm**^Q.
- Typically only **one layer** of ITGCN cells is **seen**, but occasionally the **whole tubule** is **filled with ITGCN cells**, which may represent an **early stage in progression to GCT**^Q.

Clinical Features

- Testis may be **atrophic** but is usually **normal to palpation**.
- **Testis biopsy** reliably **diagnoses ITGCN** because the **ITGCN** is almost always **found throughout the testis**^Q
- Progression of ITGCN to **invasive disease** may take **15 years**^Q.

Treatment

- Treatment options include **observation, radiation therapy, and orchiectomy**^Q
- **Chemotherapy** so far appears to be **ineffective against ITGCN**.

75. Ans. c. Inguinal lymphadenopathy

76. Ans. d. They are often associated with raised levels of serum AFP and hCG (Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729)

Tumour Markers	
Oncofetal substances	Cellular Enzymes
1. α-FP : (Increases in YET) ^Q <ul style="list-style-type: none"> • Produced by trophoblastic cells • Increases in Yolk sac tumour, embryonal carcinoma and terato carcinoma. (YET) • Doesn't increase in pure choriocarcinoma and pure seminoma^Q • Metabolic half life: 5-7 days^Q 	1. LDH : <ul style="list-style-type: none"> • Not a specific tumour marker • Most useful as a marker for “bulk” disease • Raised serum LDH has poor prognosis
2. β-hCG : (Increases in CESMINOMA) <ul style="list-style-type: none"> • Produced by syncytiotrophoblastic cells^Q • Increases in all choriocarcinomas, 50% embryonal carcinoma and 5-10% of pure seminoma (as they contain syncytiotrophoblast like giant cells). (CESMINOMA)^Q • Serum half life: 24-36 hours^Q 	2. PLAP (Placental alkaline phosphatase): <ul style="list-style-type: none"> • Elevated levels present in as many as 40% patients with advanced disease • Most useful as a marker for “bulk” disease • Elevated in seminoma^Q 3. GGT (Gamma glutamyl transpeptidase): <ul style="list-style-type: none"> • Marker of seminoma testis^Q • Marker for “bulk” disease

77. Ans. c. AFP is markedly raised in all germ cell tumors

78. Ans. b. Seminoma (Ref: Smith 17/e p376; Campbell 10/e p840, 862-866, 9/e p894-895; Bailey 26/e p1385, 25/e p1385-1387)

SEMINOMA

- Three subtypes: classic, anaplastic and spermatocytic.
- **Typical or classic seminoma**:
 - Accounts for **80-85%**^Q of all seminomas and occurs most commonly in **30 years** of age

- Histologically, it is composed of **islands or sheets of relatively large cells with clear cytoplasm and densely staining nuclei**^Q.

- **Syncytiotrophoblastic** elements occur in **10-15%**^Q and **lymphocytic infiltration** occurs in **20%**^Q. The incidence of **syncytiotrophoblastic** elements corresponds to the frequency of **β -hCG production**^Q.

- The **slower growth rate of seminomas**^Q may be inferred from the observation that **treatment failures** may become **evident 2-10 years after** apparently adequate **irradiation** of metastatic sites.

- **Anaplastic seminoma:**

- Accounts for 5% to 10% of all seminomas
- Despite its rarity, up to **30% of patients dying with seminoma** have an **anaplastic morphology**^Q.

- **More aggressive and potentially more lethal**^Q variant leading to **less favorable results**^Q.
- These characteristics include greater mitotic activity, higher rate of local invasion, increased rate of metastatic spread and higher rate of tumor marker (β -hCG) production.

- **No difference** from classic seminoma when patients are **treated appropriately** and compared **stage for stage**^Q.
- **Inguinal orchiectomy plus radiation therapy** is **equally effective** in controlling both **anaplastic** and **classic seminoma**^Q.

- **Spermatocytic seminoma:**

- Accounts for 2-12% of all seminomas
- It is **distinctive tumor both clinically and radiologically** as compared to seminoma^Q

- Variants of germ cell tumor that **do not arise from an intratubular germ cell neoplasia**^Q (the other being teratomas of children^Q).

- Composed of **cells that vary in size** and have **deeply pigmented cytoplasm** and **rounded nuclei** containing **characteristic filamentous chromatin**^Q.

- Uncommon tumor representing **1-2% of all testicular neoplasms**^Q

- Affected individuals are **>65 years**^Q

- **Slow growing tumor** that **rarely if ever produces metastases**^Q

- **Only orchidectomy** is required for treatment.

- **Prognosis is excellent**^Q

79. Ans. a. Beta-hCG, d. Alpha fetoprotein

80. Ans. d. Lymphoma (Ref: Smith 17/e p382; Campbell 10/e p868-869)

TESTICULAR LYMPHOMA

- MC testicular tumor in a patient **>50 years**^Q
- MC secondary neoplasm of the **testis**, accounting for 5% of all testicular tumors.
- It may be seen as **late manifestation of widespread lymphoma**; **initial presentation of clinically occult disease**; and **primary extranodal disease**^Q.

Pathology

- Grossly, bulging, gray or pink lesion with ill-defined margins. **Hemorrhage** and **necrosis**^Q are common.
- Microscopically, **diffuse histiocytic lymphoma** is the **MC type**^Q.

Clinical Findings

- **Painless enlargement**^Q of the testis is common.
- Generalized **constitutional symptoms** occur in one-fourth of patients.
- **Bilateral testis involvement** occurs in 50% of patients, usually **asynchronously**.

Treatment

- FNAC should be considered in a **known** or **suspected** diagnosis of **lymphoma**^Q
- **Radical orchiectomy** is reserved for suspected **primary lymphoma**^Q of the testicle.

81. Ans. a. Testicular biopsy

82. Ans. b. Seminomas are radiosensitive

83. Ans. d. Seminoma

84. Ans. a. PLAP (Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729; Bailey 25/e p1384-1387)

Tumor marker for seminoma is PLAP (Placental alkaline phosphatase). Though beta-hCG is also raised in 5-10% of pure seminoma, as they contain syncytiotrophoblast like giant cells.

85. Ans. a. 10% (Ref: Smith 17/e p375)

The **strongest association** has been with the **cryptorchid testis**. Approximately 7-10% of **testicular tumors develop in patients** who have a **history of cryptorchidism**; **seminoma is the most common form** of tumor these patients have.

TESTICULAR TUMORS: EPIDEMIOLOGY AND RISK FACTORS

- Of all primary testicular tumors, **90-95% are germ cell tumors^Q** (seminoma and nonseminoma)
- **More common in whites** and individuals of **higher socioeconomic class^Q**
- **Slightly more common on the right side** than on the left, which parallels the **increased incidence of cryptorchidism on the right side^Q**.

- Of **primary testicular tumors**, **1-2% are bilateral^Q**, and about 50% of these tumors occur in men with a history of unilateral or bilateral cryptorchidism.
 - **Seminoma is the most common germ cell tumor in bilateral primary testicular tumors^Q**, while **malignant lymphoma is the most common bilateral tumor of the testis^Q**.
- The **strongest association** has been with the **cryptorchid testis^Q**. Approximately **7-10%^Q** of testicular tumors develop in patients who have a **history of cryptorchidism**; **seminoma is the most common form** of tumor these patients have.

- However, **5-10% of testicular tumors** occur in the **contralateral, normally descended testis^Q**.
 - The **relative risk of malignancy is highest for the intraabdominal testis^Q** (1 in 20) and is significantly lower for the inguinal testis (1 in 80).
- **Orchiopexy does not alter the malignant potential of the cryptorchid testis**; however, it does **facilitate examination and tumor detection^Q**.

86. Ans. None 87. Ans. a. It is radiosensitive 88. Ans. b. Malignant
89. Ans. b. An undescended testis is more liable to develop this tumour, c. Histologically it resembles dysgerminoma of the ovary
90. Ans. c. Occurs in younger
91. Ans. b. 10% of cases (Ref: Smith 17/e p379)
- Approximately 5-10% of testicular tumors may be associated with hydroceles^Q.
92. Ans. d. Teratoma 93. Ans. a. Para-aortic lymph nodes
94. Ans. c. Testicular tumour 95. Ans. c. Radioresistant 96. Ans. a. AFP
97. Ans. c. Choriocarcinoma 98. Ans. b. USG
99. Ans. a. Seminoma 100. Ans. a. Seminoma 101. Ans. b. Hematocele
102. Ans. a. Clinical evaluation

TESTICULAR CARCINOMA STAGING

103. Ans. a. T1 (Ref: Campbell 10/e p3726-3727)

7 th AJCC (2010) TNM Staging for Testicular Tumors	
T: Primary tumor	N: Regional lymph nodes
pTis: Intratubular germ cell neoplasia (carcinoma in situ)	N1: LN mass ≤2 cm or multiple LN masses, none >2 cm
pT1: Limited to the testis and epididymis and no vascular/lymphatic invasion	N2: LN mass, >2 cm but <5 cm or multiple LN masses, any one mass >2 cm but not <5 cm
pT2: Limited to the testis and epididymis with vascular/lymphatic invasion or extending through tunica albuginea with involvement of tunica vaginalis	N3: LN mass >5 cm
pT3: Invades the spermatic cord with or without vascular/lymphatic invasion	M: Distant metastases
pT4: Invades the scrotum with or without vascular/lymphatic invasion	M1: Non-regional nodal or pulmonary metastases M2: Non-pulmonary visceral masses

Serum Tumor Markers (S)			
	LDH	hCG (mIU/mL)	AFP (ng/mL)
S0	≤N	≤N	≤N
S1	<1.5 × N	<5,000	<1,000
S2	1.5–10 × N	5,000–50,000	1,000–10,000
S3	>10 × N	>50,000	>10,000

7 th AJCC (2010) Staging for Testicular Cancer				
Stage Grouping	T	N	M	S
Stage 0	pTis	N0	M0	S0
Stage Ia	T1	N0	M0	S0
Stage Ib	T2-T4	N0	M0	S0
Stage Is	Any T	N0	M0	S1-S3
Stage IIa	Any T	N1	M0	S0-S1
Stage IIb	Any T	N2	M0	S0-S1
Stage IIc	Any T	N3	M0	S0-S1
Stage IIIa	Any T	Any N	M1	S0-S1
Stage IIIb	Any T	Any N	M0-M1	S2
Stage IIIC	Any T Any T	Any N Any N	M0-M1a M1b	S3 Any S

104. Ans. a. T1

TESTICULAR CARCINOMA TREATMENT

105. Ans. b. High inguinal orchidectomy and radiotherapy

106. Ans. a. Bleomycin, Etoposide, Cisplatin

107. Ans. c. Left high inguinal orchiectomy plus chemotherapy (Ref: Smith 17/e p379-381; Campbell 10/e p871-873, 3726-3727; Bailey 25/e p1386-1387)

Staging and Treatment			
Stage	Extent of disease	Seminoma	Nonseminoma
IA	Testis only, without vascular or lymphatic invasion (T ₁)	Radiation therapy ^a	RPLND or observation ^a
IB	Testis with vascular or lymphatic invasion (T ₂), or extension through tunica albuginea (T ₂), or involvement of spermatic cord (T ₃), or scrotum (T ₄)	Radiation therapy ^a	RPLND ^a
IIA	Nodes ≤ 2 cm (N ₁), S0/S1	Radiation therapy	RPLND or chemotherapy followed by RPLND ^a
IIB	Nodes >2-5 cm (N ₂), S0/S1	Radiation therapy ^a	RPLND ± adjuvant chemotherapy or chemotherapy followed by RPLND ^a
IIC	Nodes > 5 cm (N ₃), S0/S1	Chemotherapy ^a	Chemotherapy followed by RPLND ^a
III	Distant metastasis	Chemotherapy ^a	Chemotherapy followed by surgery (biopsy or resection) ^a
Is	Only serum tumor markers are raised (S ₁ to S ₃) ^a	Chemotherapy ^a	Chemotherapy ^a

108. Ans. a. Chemotherapy

109. Ans. b. High Orchidectomy + RPLND

110. Ans. b. Chemotherapy

111. Ans. c. only chemotherapy

112. Ans. a. Orchidectomy + RPLND (Ref: Smith 17/e p376; Campbell 10/e p841, 3727-3728; Bailey 25/e p1385-1387)

TERATOMA

- Most common testicular tumor in prepubertal adults: Teratoma^a
- Tumor is composed of two or more embryonic germ cell layers^a that may be both mature and immature.
- Tumor is very heterogeneous with both solid and cystic^a components.

Teratoma is divided into three subsets

1. **Mature:** well-differentiated ectodermal, mesodermal, or endodermal tissues
2. **Immature:** incompletely differentiated tissues
3. **Teratoma with areas of malignant transformation:** sarcoma, squamous carcinoma, adenocarcinoma

- Teratomas are potentially malignant^a

Clinical Features

- Age range: first, second, and third decades.
- Mature and immature forms have metastatic potential in adults but in children are uniformly benign^a.
- The primary tumor generally presents as an enlarged testis with both solid and cystic components^a.
- The teratoma component of metastatic GCT is resistant to chemotherapy and radiotherapy^a.

Tumor Markers

- AFP is raised in 20-25%^a

113. Ans. d. Observation /RPLND 114. Ans. d. Retrograde ejaculation (Ref: Smith 17/e p380)

RETROPERITONEAL LYMPH NODE DISSECTION (RPLND)

- RPLND has been the preferred treatment of low-stage NSGCTs^Q
 - A thoracoabdominal or midline Transabdominal approach may be used
 - All nodal tissue between the ureters from the renal vessels to the bifurcation of the common iliac vessels is removed^Q.
- RPLND is associated with significant morbidity, especially with respect to fertility in young men^Q.
 - With a standard RPLND, sympathetic nerve fibers are disrupted, resulting in loss of seminal emission^Q.

115. Ans. c. Seminoma

116. Ans. a. RPLND, b. Inguinal orchidectomy, c. chemotherapy

SEX CORD/GONADAL STROMAL TUMORS

117. Ans. b. Prominent lymphocytes in section (Ref: Smith 17/e p381; Campbell 10/e p867-868)

LEYDIG CELL TUMORS

- MC non-germ cell tumors of testis and account for 1-3% of all testicular tumors.
- Bimodal age distribution: 5-9 years and 25-35 years
- 25% tumors occur in childhood, bilateral in 5-10%.
- Cause: unknown; unlike germ cell tumors (no association with cryptorchidism)^Q

Pathology

- Small, yellow, well-circumscribed lesion devoid of hemorrhage or necrosis.
- Microscopically, hexagonally shaped cells with granular, eosinophilic cytoplasm containing lipid vacuoles are seen.
- Reinke crystals^Q are fusiform-shaped cytoplasmic inclusions are pathognomonic for Leydig cells.

Clinical Features

- Prepubertal children present with virilization, and tumors are benign^Q.
- Adults are usually asymptomatic, although gynecomastia may be present in 20-25%^Q.
- 10% of tumors in adults are malignant.
- Laboratory findings include elevated serum and urinary 17-ketosteroids and estrogens^Q.

Treatment

- Initial treatment: Radical orchiectomy^Q
- RPLND for malignant lesions^Q.

Prognosis

- Prognosis is excellent for benign lesions, while it remains poor for disseminated disease.

CARCINOMA SCROTUM

118. Ans. a. Superficial inguinal (Ref: Smith's Urology 17/e p387)

CARCINOMA SCROTUM (CHIMNEY SWEEP'S CANCER)

- Squamous cell carcinoma of scrotum^Q, most commonly resulted from exposure to environmental carcinogens including chimney soot, tars, paraffin and petroleum products^Q.
- Superficial inguinal lymph nodes are the first lymph nodes involved.^Q

Risk Factors

- Most cases results from poor hygiene and chronic inflammation^Q.

Diagnosis

- Diagnosis is established by biopsy of scrotal skin^Q.

Treatment

- Wide excision with 2 cm margins^Q should be performed for malignant tumors.
- Prognosis correlates with presence or absence of nodal involvement^Q.

ORCHIDECTOMY

119. Ans. b. Prostate (Ref: Bailey 25/e p1378; Smith 17/e p368)

Bilateral orchidectomy, whether total or subcapsular, will eliminate the major source of testosterone production in patients of carcinoma prostate.

CARCINOMA PROSTATE

- **Orchidectomy** is performed to carry out androgen ablation in the treatment of locally advanced (T3 or T4) disease or of metastatic disease^Q.
- In 1941, prostate cancer was shown to be responsive to such treatment by **Charles Huggins**, the only urologist to win a Nobel Prize.
- **Bilateral orchidectomy**, whether total or subcapsular^Q, will eliminate the major source of testosterone production.

120. Ans. b. Internal ring (Ref: Bailey 26/e p1387, 25/e p1387)

HIGH INGUINAL ORCHIDECTOMY

- The cord must be ligated as close as possible to the internal ring to facilitate complete removal of cord tissue^Q in case a later retroperitoneal lymph node dissection is required.

121. Ans. b. Prostate

122. Ans. c. Filarial epididymo-orchitis

123. Ans. c. Tubercular epididymitis (Ref: Bailey 25/e p1358, 1382, 1387)

INDICATIONS OF ORCHIDECTOMY

- Clotted hydrocele^Q
- Testicular tumors^Q
- Prostate cancer^Q
- Male breast cancer^Q

MISCELLANEOUS

124. Ans. b. Totipotent cell

125. Ans. d. Small strangulated inguinal hernia

126. Ans. b. Hematocele

127. Ans. d. Ten years

128. Ans. d. Azoospermia (Ref: Smith 17/e p696)

TESTICULAR BIOPSY IN MALE INFERTILITY

- The testis biopsy provides direct information regarding the state of spermatogenesis^Q.
- Abnormalities of seminiferous tubule architecture and cellular composition are then categorized into several patterns^Q.
 - This procedure is most useful in the azoospermic patient^Q, in which it is often difficult to distinguish between a failure of sperm production and obstruction within the reproductive tract ducts.
 - A testis biopsy allows definitive delineation between these 2 conditions and can guide further treatment options in azoospermic men^Q.
- Testis biopsies may also be indicated to identify patients at high risk for intratubular germ cell neoplasia. This premalignant condition exists in 5% of men with a contralateral germ cell tumor of the testis and is more prevalent in infertile than fertile men^Q.

129. Ans. b. Ilioinguinal nerve (Ref: BDC 5/e vol II p224; 4/e vol II p201, 208; Snells 7/e p175-177; Grays Anatomy 40/e p1262)

Ilioinguinal nerve is not a constituent of spermatic cord, hence, it is not damaged during vasectomy.

130. Ans. c. Hematoma (Ref: Schwartz 9/e p1467)

IMPORTANT TOPICS

- Length of one seminiferous tubule: 1 meter^Q
- Total length of seminiferous tubules: 250 meters^Q
- Length of epididymis: 4 meters^Q

Most Common Lymph Nodes Involved

CA Penis	Inguinal LN ^Q
CA Testis	On right: Inter-aortocaval ^Q LN On left: Paraaortic ^Q LN
CA Bladder	Obturator ^Q LN
CA Prostate	Obturator ^Q LN

SECTION 5

CARDIOTHORACIC VASCULAR SURGERY

CHAPTERS

- ❖ Arterial Disorders
- ❖ Venous Disorders
- ❖ Lymphatic System
- ❖ Thorax and Lung

Arterial Disorders

MULTIPLE CHOICE QUESTIONS

ARTERIAL OCCLUSION

1. **Acute vascular ischemia manifests as:** (PGI Dec 2008)
 - a. Pulselessness
 - b. Paralysis
 - c. Flushing
 - d. Anesthesia
 - e. Coolness
2. **Syndrome of internal iliac artery occlusion manifested by:** (PGI June 2005)
 - a. Pain in calf
 - b. Absent pulse at the dorsalis pedis artery
 - c. Intermittent claudication
 - d. Gangrene
3. **The most common cause of peripheral limb ischemia in India is:** (AIIMS Nov 2005)
 - a. Trauma
 - b. Atherosclerosis
 - c. Buerger's disease
 - d. Takayasu disease
4. **Which among the following is not a feature of peripheral arterial occlusion?** (NEET Pattern, AIIMS Nov 99)
 - a. Shock
 - b. Pallor
 - c. Pain
 - d. Pulselessness
5. **Not a feature of acute arterial occlusion:** (DNB 2010, AIIMS Nov 98)
 - a. Cyanosis
 - b. Pallor
 - c. Paralysis
 - d. Paraesthesia
6. **Peripheral arterial occlusion (sudden onset) is characterized by all except:** (PGI June 2000, Dec 98)
 - a. Paraesthesia
 - b. Rubor
 - c. Pallor
 - d. Pain
7. **What will be the diagnosis of Ramu, who is 45-years old male with history of chronic smoking and pain in lower limb due to blockage of femoral artery?** (AIIMS Feb 97)
 - a. Thromboangitis obliterans
 - b. Atherosclerosis
 - c. Embolism
 - d. Arteritis
8. **Fogarty's catheter is used for:** (Recent Question 2015; UPSC 2007)
 - a. Drainage of urinary bladder
 - b. Parenteral hyperalimentation
 - c. Removal of embolus from blood vessels
 - d. Ureteric catheterization
9. **Fogarty's catheter is used for:** (AIIMS Nov 2010)
 - a. Urethral catheterization
 - b. Removal of blood clots from the arteries
 - c. Bladder drainage
 - d. TPN
10. **Which one of the following is not a symptom of atherosclerotic occlusive disease at the bifurcation of aorta (Leriche syndrome)?** (UPSC 2008)
 - a. Claudication of buttock and thigh
 - b. Claudication of the calf
 - c. Sexual impotence
 - d. Gangrene localized to the feet
11. **Intermittent claudication is defined as:** (All India 2009)
 - a. Pain in muscle at rest only
 - b. Pain in muscle on first step
 - c. Pain in muscle on exercise only
 - d. Pain in muscle on last step
12. **Pseudoclaudication is caused by:** (All India 2009)
 - a. Femoral artery stenosis
 - b. Popliteal artery stenosis
 - c. Lumbar canal stenosis
 - d. Radial artery stenosis
13. **In a subclavian artery block at outer border of 1st rib, all of the following arteries help in maintaining the circulation to upper limb except?** (AIIMS May 2011)
 - a. Subscapular artery
 - b. Superior thoracic artery
 - c. Thyrocervical trunk
 - d. Suprascapular artery
14. **Both arterial and venous thrombosis occur in:** (PGI Nov 2011)
 - a. Antiphospholipid antibodies
 - b. Antithrombin III deficiency
 - c. Hyperhomocysteinemia
 - d. Protein C deficiency
 - e. Mutation in factor V gene
15. **Maximum tourniquet time for the upper limb is:** (JIPMER 87)
 - a. 1/2 hour
 - b. 1 hour
 - c. 1.5 hours
 - d. 2 hours
 - e. 2.5 hours
16. **Intermittent claudication at the level of the hip indicates:** (PGI 87)
 - a. Popliteal artery occlusion
 - b. Bilateral iliac artery occlusion
 - c. Common femoral occlusion
 - d. Superficial femoral artery occlusion
17. **Management of a case of iliac artery embolism requires:** (JIPMER 81, UPSC 86)
 - a. Embolectomy
 - b. Injection
 - c. Hypotensive therapy
 - d. Sympathectomy
18. **Intermittent claudication is caused by:** (TN 89)
 - a. Venous occlusion
 - b. Arterial insufficiency
 - c. Neural compression
 - d. Muscular dystrophy

19. **Treatment of acute femoral embolus is:** (AIIMS 91)
 a. Warfarin
 b. Heparin
 c. Immediate embolectomy
 d. Embolectomy after 5 days bed rest
20. **A useful though temporary improvement in a patient's ischemic foot can be attained by giving intravenously:** (PGI 79, DPG 84)
 a. 10% Mannitol
 b. 10% Dextrose
 c. Dextran-40
 d. Dextran-100
21. **All are true about embolic arterial occlusion except:** (JIPMER 95)
 a. No previous history
 b. Muscles are unaffected
 c. Pulse is absent
 d. Anesthesia is present
22. **Tourniquet time of upper limb:** (MHSSMCET 2010)
 a. 1 hour
 b. 2 hours
 c. 3 hours
 d. 4 hours
-
- ### BUERGER'S DISEASE
-
23. **Not included in treatment of Buerger's disease:** (PGI May 2011)
 a. Lumbar sympathectomy
 b. Endovascular stent
 c. Rheostatic agent
 d. Extra-anatomical bypass
24. **All are true about intermittent claudication except:** (PGI May 2010)
 a. Most common in calf muscle
 b. Pain in positional
 c. Atherosclerosis is important predisposing factor
 d. Relieved by rest
25. **A 45-years old male having a long history of cigarette smoking presented with gangrene of left foot. An amputation of the left foot was done. Representative sections from the specimen revealed presence of arterial thrombus with neutrophilic infiltrate in the arterial wall. The inflammation also extended into the neighboring veins and nerves. The most probable diagnosis is:** (AIIMS May 2006)
 a. Takayasu arteritis
 b. Giant cell arteritis
 c. Hypersensitivity angitis
 d. Thromboangitis obliterans
26. **True statement of Buerger's disease is/are:** (PGI June 2004)
 a. Small and medium sized vessels involved
 b. Commonly involves upper limb than lower limbs
 c. Common in male
 d. Common in female
27. **Drug used for Buerger's disease:** (MAHE 2005)
 a. Xanthinol nicotinate
 b. Propranolol
 c. GTN
 d. All of the above
28. **Buerger's disease usually affects all of the following except:** (Recent Question 2014; MCI Sept 2009, 2010)
 a. Small sized arteries
 b. Medium sized arteries
 c. Large arteries
 d. Deep veins
29. **Superficial thrombophlebitis is seen in:** (MCI March 2005)
 a. AV fistula
 b. Raynaud's disease
 c. Buerger's disease
 d. Aneurysm
30. **Which of the following is true about Buerger's disease?** (AIIMS Nov 2012)
 a. Atherosclerotic
 b. Neural involvement present
 c. Ulnar artery and peroneal arteries involved
 d. Only arteriole is involved
31. **True about ischemic rest pain:** (PGI May 2010)
 a. More in night
 b. MC in calf muscle
 c. Increase upon elevation of limbs
 d. Relieved by dependent position
 e. Often associated with trophic changes
32. **Most common vessels to be affected in Buerger's disease:** (MCI March 2005)
 a. Femoral artery
 b. Iliac artery
 c. Popliteal artery
 d. Anterior and posterior tibial artery
33. **Most common cause of gangrene of foot of 30-years old farmer who is a chronic smoker:** (AIIMS Nov 99)
 a. Raynaud's disease
 b. Myocardial infarction
 c. Atherosclerosis
 d. Thromboangitis obliterans
34. **Ramu, a 40-years old male, a chronic smoker presents with claudication and a medial leg ulcer. For the past following procedures would not relieve his rest pain:** (AIIMS June 2001)
 a. Lumbar sympathectomy
 b. Omentoplasty
 c. Conservative amputation
 d. Femoropopliteal bypass
35. **Which one is not true regarding Buerger's disease?** (AIIMS June 97)
 a. Men are usually involved
 b. Occurs below 50 years of age
 c. Smoking is predisposing factor
 d. Veins and nerves are never involved
36. **All of the following are the clinical feature of thromboangitis obliterans except:** (All India 2002)
 a. Raynaud's phenomenon
 b. Claudication of extremities
 c. Absence of popliteal pulse
 d. Migratory superficial thrombophlebitis
37. **Buerger's disease is associated with:** (PGI June 2002)
 a. Smoking
 b. Poor nutrition
 c. Alcohol
 d. Prolonged standing
 e. Superficial thrombophlebitis
38. **Buerger's disease affects all except:** (Recent Question 2015; DNB 2009)
 a. Lymphatics
 b. Small vessels
 c. Nerves
 d. Veins
39. **Most common cause of death in patients with Buerger's disease is:** (AIIMS 87)
 a. Gangrene
 b. Pulmonary embolism
 c. Myocardial infarction
 d. Carcinoma lung
40. **Buerger's disease is seen in:** (PGI 88)
 a. Only male
 b. Age less than 40
 c. Age more than 40
 d. Smoker
41. **Commonest site of thromboangitis obliterans is:** (All India 90)
 a. Femoral artery
 b. Popliteal artery
 c. Iliac artery
 d. Pelvic vessels
42. **Following are used in treatment of Buerger's disease except:**
 a. Trental
 b. Anticoagulation
 c. Sympathectomy
 d. Antiplatelets (All India 93)
-
- ### LUMBAR SYMPATHECTOMY
-
43. **Indications for sympathectomy are all except:** (MHPGMCET 2003)
 a. Intermittent claudication
 b. Ischemic pains
 c. Rest pains
 d. Buerger's disease

44. Lumbar sympathectomy is of value in the management of:
 a. Intermittent claudication (All India 2009, 2005)
 b. Distal ischemia affecting the skin of the toes
 c. Arteriovenous fistula
 d. Back pain

45. Sympathectomy is indicated in all following conditions except:
 (All India 2009, 2003, Punjab 2007)
 a. Ischemic ulcers b. Intermittent claudication
 c. Anhidrosis d. Acrocyanosis

46. Which of the following is spared in lumbar sympathectomy?
 a. L1 b. L2 (Recent Question 2015)
 c. L3 d. L4

47. In all of the following, sympathectomy is effective except one:
 (AIIMS Sept 96)
 a. Intermittent claudication b. Hyperhydrosis
 c. Raynaud's disease d. Causalgia

48. Lumbar sympathectomy is not indicated in: (AIIMS June 97)
 a. Healing of ulcer over great toe
 b. Claudication
 c. Rest pain
 d. Buerger's disease

49. Which of the following best responds to sympathectomy?
 (JIPMER 86)
 a. Buerger's disease b. Hyperhydrosis
 c. Raynaud's disease d. Acrocyanosis

50. In extraperitoneal approach, to left sympathectomy the following may be injured:
 a. Ureter b. Gonadal vessels
 c. A+B d. IVC

51. In a lumbar sympathectomy the sympathetic chain in its usual position is likely to be confused with the:
 (PGI 81, AIIMS 82)
 a. Ureter
 b. Psoas minor c. Genitofemoral nerve
 d. Ilioinguinal nerve e. Lymphatics

52. Removal of L1 ganglion in sympathectomy results in:
 (DNB 2006, JIPMER 91)
 a. Impotence
 b. Retention of urine
 c. Sterility
 d. Causalgia

CRITICAL LIMB ISCHEMIA

53. Which of the following statement is not true?
 a. Ankle brachial index <0.5 indicates critical limb ischemia
 b. Ankle brachial index changes during exercise and rest
 c. Ankle brachial index >1 is normal (AIIMS Nov 2011)
 d. Smoking is more specific for peripheral vascular disease than coronary artery disease

54. A patient with critical lower limb ischemia presents with:
 a. Intermittent claudication
 b. Intermittent claudication and gangrene
 c. Rest pain and ischemic ulcers (All India 2009)
 d. Intermittent claudication and ischemic ulcers

55. An adult patient with leg pain and gangrene of toe. His ankle to brachial arterial pressure ratio would be less than:
 a. 1 b. 0.3 (DNB 2011)
 c. 0.5 d. 0.8

56. Definition of critical limb ischemia includes:
 (COMEDK 2014)
 a. Rest/Night pain
 b. Ankle blood pressure > 50 mm Hg
 c. Intermittent claudication
 d. Well preserved tissues

57. Normal value of ankle brachial index is:
 (Recent Questions 2014, 2013)
 a. 0.8 b. 1
 c. 1.2 d. 1.4

58. ABPI in imminent necrosis:
 (Recent Question 2015)
 a. <0.3 b. <0.6
 c. <0.9 d. >1.2

ARTERIAL ULCER

59. One of the following is not indicated for arterial leg ulcer:
 a. Debridement b. Elevation of limb (PGI 96)
 c. Head end of bed is raised d. Low dose aspirin
60. Foot ulcers secondary to arterial insufficiency are successfully treated by all of the following techniques except:
 (COMEDK 2004)
 a. Debridement of devitalized tissue
 b. Elevation of the affected extremity
 c. Antibiotic administration
 d. Bed rest

AMPUTATION

61. Re-implantation time for lower limb is:
 (Kerala 97)
 a. 6 hours b. 4 hours
 c. 8 hours d. 10 hours

62. Stump pain is relieved by:
 (Kerala 97)
 a. Continuous tapping over the stump
 b. Warming up the stump
 c. Using steroids
 d. Using analgesics

63. For reimplantation surgery, the detached digit or limb is best preserved in cold:
 (Recent Question 2014; UPSC 2000)
 a. Glycerol b. Distilled water
 c. Hypertonic saline d. Isotonic saline

64. Phantom limb is based upon:
 (DNB 2009)
 a. Law of projection b. Webers law
 c. Munro-Kellie doctrine d. Renshaw cell inhibition

ARTERIOVENOUS FISTULA

65. Nicoladoni sign is also known as:
 (AIIMS Nov 2008)
 a. Murray sign b. Frei sign
 c. Darrier sign d. Branham sign

66. All of the following are correct regarding AV fistula except:
 a. Arterialisation of the veins
 b. Proximal compression causes increases in heart rate
 c. Localized gigantism (MHSSMCET 2005, All India 2001)
 d. Causes LV enlargement and cardiac failure

67. A patient presented with local gigantism of the leg and increased pulsations of the lower limb veins. Most probable diagnosis is:
 (AIIMS Nov 2001)
 a. Tumor
 b. AV fistula
 c. Varicose veins
 d. Incompetence of the saphenofemoral junction

68. True regarding AV fistula is:
 (PGI June 2002)
 a. Leads to cardiac failure
 b. Causes local gigantism
 c. Can cause ulcers
 d. Causes excess bleeding on injury
 e. Closes spontaneously

69. **AV fistula causes:** (PGI Dec 2002)
 a. Leads to cardiac failure
 b. Causes local gigantism
 c. Endocarditis
 d. Local ulceration and hemorrhage
 e. Closes spontaneously
70. **Nicoladoni Branham sign is:** (PGI Dec 98)
 a. Compression cause bradycardia
 b. Compression cause tachycardia
 c. Hypotension
 d. Systolic filling
71. **The most common cause of acquired arteriovenous fistula is:** (All India 2006)
 a. Bacterial infection b. Fungal infection
 c. Blunt trauma d. Penetrating trauma
72. **Commonest cause of A-V fistulae is:** (Recent Question 2013, DNB 2000)
 a. Congenital b. Traumatic
 c. Surgical creation d. Tumor erosion
73. **Congenital A-V fistulas in the thigh will be associated with all except:** (PGI 89)
 a. Increased cardiac output
 b. Increased skin temperature
 c. Gigantism of limb
 d. Superficial venous engorgement
74. **Complications arising out of A-V fistula done for renal failure include the following except:** (JIPMER 2003)
 a. Infection
 b. Thrombosis
 c. High output cardiac failure
 d. Necrosis of the distal part
75. **Arteriovenous fistula can safely be ligated if the following is positive:** (COMEDK 2004)
 a. Allen's test b. Henle-Coenen sign
 c. Trendelenberg test d. Schwartz test

THORACIC OUTLET SYNDROME

76. **Thoracic outlet syndrome is primarily diagnosed by:**
 a. Clinical evaluation b. CT scan (All India 2009)
 c. MRI d. Angiography
77. **Which of the following is not a complication of surgery for thoracic outlet syndrome?** (AIIMS May 2007)
 a. Pneumothorax b. Brachial plexus injury
 c. Lymphocutaneous fistula d. Long thoracic nerve injury
78. **Adson's test is positive in:** (MHSSMCET 2005)
 a. Cervical spondylosis b. Fracture ribs
 c. Cervical rib d. All of the above
79. **Which is not true about thoracic outlet syndrome?**
 a. Radial nerve is commonly affected (AIIMS Nov 98)
 b. Neurological features are most common
 c. Resection of 1st rib relieves symptom
 d. Positive Adson's test
80. **Which is not true regarding thoracic inlet syndrome?** (AIIMS Sept 96)
 a. Most commonly radial nerve
 b. Resection of 1st rib is effective treatment
 c. Physiotherapy and position exercises relieves symptom
 d. Neurological signs and symptoms are common
81. **Commonest symptom associated with thoracic outlet syndrome is:** (PGI 87)
 a. Intermittent claudication b. Pain on radial distribution
 c. Pain in ulnar distribution d. Gangrene

82. **All are seen in thoracic outlet syndrome except:** (PGI 97)
 a. Mass in the neck
 b. Wasting of forearm muscles
 c. Adson's test positive
 d. Pallor

83. **Adson test is used for determining vascular sufficiency. It is useful in:** (Recent Question 2013)
 a. Peripheral vascular disease
 b. Varicose veins
 c. Cervical rib
 d. AV fistula

84. **Most common age group affected in thoracic outlet obstruction syndrome is?** (DNB 2014)
 a. 10–25 years b. 25–45 years
 c. 45–65 years d. > 65 years

RAYNAUD'S DISEASE

85. **All of the following are true regarding Raynaud's phenomenon except:** (AIIMS Nov 2012)
 a. It involves acral parts of fingers
 b. Migratory thrombophlebitis is seen only in Raynaud's phenomenon
 c. Drugs acting by inhibiting the beta receptors in blood vessels also play a role
 d. Emotional stress may also precipitate Raynaud's phenomenon
86. **True statement about Raynaud's phenomena:** (PGI Dec 2006)
 a. Lower limb more commonly involved than upper limb
 b. More common in female
 c. Superficial thrombophlebitis
 d. Associated with migraine
87. **Raynaud's syndrome occurs in all of the following except:** (DNB 2009, MCI Sept 2007)
 a. SLE
 b. Rheumatoid arthritis
 c. Osteoarthritis
 d. Cryoglobulinemia

88. **Sequence of colour changes observed in Raynaud's disease:** (MCI Sept 2009)
 a. Red, blue, white
 b. White, blue, red
 c. Blue, red, white
 d. White, red, blue
89. **If a patient with Raynaud's disease immersed his hand in cold water, the hand will:** (All India 2003)
 a. Become red b. Remain unchanged
 c. Turn white d. Become blue
90. **All are true about Raynaud's phenomena except:** (Kerala 95)
 a. Exposure to cold aggravates
 b. Spasm of vessels
 c. More common in females
 d. Atherosclerosis of vessels

DIABETIC FOOT

91. **True regarding management of diabetic foot:** (PGI May 2010)
 a. Strict diabetic control
 b. Venous system is commonly involved
 c. Topical antibiotics are used
 d. Early amputation should done
 e. Diabetic ulcers are trophic ulcers

92. Site of diabetic foot ulcer: (PGI June 2005)

- a. Medial malleolus
- b. Lateral malleolus
- c. Heel
- d. Head of metatarsal
- e. Head of toes

93. Diabetic gangrene is due to: (Kerala 94)

- a. Ischemia
- b. Increased blood glucose
- c. Altered defense by host and neuropathy
- d. All of the above

94. Diabetic gangrene is due to all except: (TN 86)

- a. Vasospasm
- b. Atherosclerosis
- c. Peripheral neuritis
- d. Increased sugar in blood

95. Etiopathogenesis of diabetic foot include the following except: (UPSC 2007)

- a. Myelopathy
- b. Osteoarthropathy
- c. Microangiopathy
- d. Infection

AORTIC DISSECTION

96. The most common site of acute aortic dissection is:

- a. Right lateral wall of ascending aorta
- b. Arch of aorta (DNB 2013, COMEDK 2010)
- c. Suprarenal abdominal aorta
- d. Infrarenal abdominal aorta

97. A 50-years old male patient, an alcoholic and smoker presents with a 3 hours of severe retrosternal chest pain and increasing shortness of breath. He started having this pain while eating, which was constant and radiated to the back and interscapular region. He was a known hypertensive. On examination, he was cold and clammy with a heart rate of 130/min, and a BP of 80/40 mmHg. JVP was normal. All peripheral pulses were present and equal. Breath sounds were decreased at the left lung base and chest x-ray showed left pleural effusion. What is the most likely diagnosis?

- a. Acute aortic dissection
- b. Acute myocardial infarction
- c. Rupture of the esophagus
- d. Acute pulmonary embolism

98. Dissection of which artery is seen in pregnancy?

- a. Carotid artery
- b. Aorta (PGI June 2000)
- c. Coronary artery
- d. Femoral artery

AORTIC ANEURYSM

99. Most common cause of abdominal aortic aneurysm is:

- a. Atherosclerosis
- b. Trauma (All India 2010)
- c. Syphilis
- d. Vasculitis

100. False statement about abdominal artery aneurysm (AAA):

- a. Surgery indicated when size AAA >6 cm (PGI Nov 2011)
- b. 90% of AAA is present below renal artery
- c. Blue toe syndrome may be associated
- d. Mortality rate after surgery is >25%
- e. Commonly causes colon ischemia

101. The most common site of rupture of abdominal aortic aneurysm is: (All India 2009)

- a. Laterally into the left retroperitoneum
- b. Laterally into the right retroperitoneum
- c. Posteriorly into the posterior retroperitoneum
- d. Anteriorly into the peritoneum (Intraperitoneal)

102. Most common complication of descending aortic aneurysm surgery: (MHSSMCET 2006)

- a. Renal failure
- b. Distal emboli
- c. Pulmonary infections
- d. Myocardial infarction

103. The size at which elective surgery is indicated in abdominal aortic aneurysm: (MHSSMCET 2008)

- a. 5 cm
- b. 5.5 cm
- c. 6 cm
- d. 6.5 cm

104. Abdominal aneurysm is characterized by all except:

(PGI June 2000)

- a. Elective surgery complication should be <5%
- b. Emergency surgery complication <10%
- c. Rarely asymptomatic before rupture
- d. Bigger the size it is more prone to rupture

105. Mycotic aneurysm is aneurysm infected because of:

(All India 2006)

- a. Fungal infection
- b. Blood borne infection (Intravascular)
- c. Infection introduced from outside (Extravascular)
- d. Both intravascular and extra-vascular infection

106. The procedure of choice for the evaluation of aortic aneurysm is: (Recent Question 2013, All India 2006)

- a. Ultrasonography
- b. Computed tomography
- c. Magnetic resonance imaging
- d. Arteriography

107. Which of the following is true about coeliac plexus block?

- a. Located retroperitoneally at the level of L3
- b. Usually done unilaterally (AIIMS May 2013)
- c. Useful for the painful conditions of lower abdomen
- d. Most common side effect is diarrhea and hypotension

108. Most common cause of aneurysm of abdominal aorta is:

- a. Trauma
- b. Atherosclerosis (All India 96)
- c. Syphilis
- d. Cystic medial necrosis

109. In the abdomen, aneurysms of the commonly occur next only to the aorta: (PGI 88)

- a. Internal iliac artery
- b. External iliac artery
- c. Splenic artery
- d. Inferior mesenteric artery

110. After doing a graft repair of a thoraco-abdominal aneurysm, the patients developed weakness. Most probable cause for this: (AIIMS May 2012)

- a. Decreased blood supply to the lower limbs
- b. Thoraco splanchnic injury
- c. Discontinuation of arteria radicularis magna
- d. Lumbosacral nerve injury

111. All of the following are true about aortic aneurysm except: (JIPMER 2013)

- a. Saccular aneurysm involves whole circumference
- b. True aneurysm involves all 3 layers
- c. Atherosclerosis is the commonest cause
- d. False aneurysm is not covered by all 3 layers

112. Dissecting aneurysm is best diagnosed by: (WBPG 2015)

- a. CT
- b. MRI
- c. Angiography
- d. VSG

FEMORAL ARTERY ANEURYSM

113. **Treatment of femoral artery aneurysm:** (PGI June 2007)
 a. Ultrasound guided compression of the neck of aneurysm
 b. Thrombin injection
 c. Bypass graft repair
 d. Ligation of involved vessel
114. **Pseudoarterial aneurysm in drug abuser's seen in:**
 a. Radial (PGI June 2005, June 2007)
 b. Brachial c. Femoral
 d. Carotid e. Pedal
115. **Pseudoaneurysm in IV drug abusers is commonly found in:** (PGI Dec 2008)
 a. Radial artery b. Brachial artery
 c. Femoral artery d. External iliac artery
 e. Dorsalis pedis artery

POPLITEAL ARTERY ANEURYSM

116. **Most common site of peripheral aneurysm:** (Recent Question 2015; AIIMS Nov 2008)
 a. Femoral artery b. Radial artery
 c. Popliteal artery d. Brachial artery
117. **Commonest peripheral aneurysm is:** (SCTIMS 98)
 a. Popliteal b. Femoral
 c. Carotid d. Iliac
118. **Popliteal aneurysm-all are true except:** (SCTIMS 98)
 a. Presents as a swelling behind the knee
 b. Presents with symptoms due to complication
 c. Surgery is indicated in case of complication
 d. Uncommon among peripheral aneurysm

PSEUDOANEURYSM

119. **Pseudoaneurysms are most commonly due to:** (Recent Question 2015; JIPMER 93)
 a. Atherosclerosis b. Trauma
 c. Congenital deficiency d. Infections
120. **Pseudoaneurysm in I.V. drug abusers is commonly found in:** (PGI Dec 2008, June 2007)
 a. Radial artery b. Brachial artery
 c. Femoral artery d. External iliac artery
 e. Dorsalis pedis artery
121. **A drug abuser developed pseudoaneurysm. Which of the following is/are should include in the treatment modalities?** (PGI Dec 2008)
 a. Ligation of involved vessel and wide surgical debridement
 b. Exposure and ligation with subsequent revascularization
 c. Direct interposition graft with synthetic material in groin for revascularization
 d. Direct interposition graft with autogenous graft
 e. Selective revascularization using remote iliofemoral bypass

SUBCLAVIAN STEAL SYNDROME

122. **Commonest part of subclavian artery to be affected by stenosis is:** (All India 2009)
 a. First part
 b. Second part
 c. Third part
 d. Equally affected

123. **Which of the following statement is true regarding subclavian steal syndrome?** (AIIMS Nov 2005)

- a. Reversal of blood flow in the ipsilateral vertebral artery
 b. Reversal of blood flow in the contralateral carotid artery
 c. Reversal of blood flow in the contralateral vertebral artery
 d. Bilateral reversal of the flow in the vertebral arteries

VASCULAR GRAFT

124. **Best graft for femoropopliteal bypass?** (MHSSMCET 2007)
 a. Autologous vein b. Dacron
 c. Teflon d. PTF
125. **Best material for below inguinal arterial graft is:** (WBPG 2015; All India 2009)
 a. Saphenous vein graft (upside-down)
 b. PTFE
 c. Dacron
 d. Teflon
126. **Neointimal hyperplasia causes vascular graft failure as a result of hypertrophy of:** (All India 2006)
 a. Endothelial cells b. Collagen fibers
 c. Smooth muscle cells d. Elastic fibers
127. **Dacron vascular graft is:** (Recent Question 2013, All India 2006)
 a. Nontextile synthetic b. Textile synthetic
 c. Nontextile biologic d. Textile biologic
128. **Preferred material for femoro-popliteal bypass:** (Recent Question 2014)
 a. Dacron b. PTFE
 c. Saphenous vein d. Gortex
129. **For aortic graft the best material available is:**
 a. Dacron b. Artery (JIPMER 81, DPG 92)
 c. Vein d. None
130. **A knitted dacron artery graft:** (PGI 99, AIIMS 84)
 a. Is not porous
 b. Is eventually dissolved by tissue reaction
 c. Never gets infected
 d. Can be easily incised and the opening resutured
131. **Not used as graft material in peripheral vascular disease:** (PGI 97)
 a. Dacron graft b. Vein
 c. PTFE d. PVC
132. **Graft used in infra inguinal by pass is:** (JIPMER 2000)
 a. PTFE b. Dacron
 c. Autologous vein d. Autologous artery

VASCULAR TRAUMA

133. **Bullet wounds near major blood vessels should be explored only if:** (PGI 81, AMC 85)
 a. The extremity is cold
 b. The fingers or toes are paralyzed
 c. The pulse is weakened
 d. There is no pulse
 e. In all cases regardless of physical findings
134. **True about aortic transection:** (PGI June 2008)
 a. Most commonly associated with deceleration injury
 b. High mortality
 c. Surgery definitive treatment
 d. Aortography gold standard
135. **Radiological findings of torn thoracic aorta is/are:** (PGI Nov 2011)
 a. Mediastinal widening
 b. Abnormal aortic contour
 c. Right apical pleural cap
 d. Right paratracheal stripe thickening
 e. Left apical pleural cap

136. Best approach for surgical repair of the injury to abdominal aorta above the level of renal artery involving superior artery, celiac trunk, and the suprarenal branch: (MHSSMCET 2009)
- Right medial visceral rotation
 - Left medial visceral rotation
 - Right Lateral visceral rotation
 - Left Lateral visceral rotation

ANGIOGRAPHY AND COMPLICATIONS

137. Seldinger needle is used for: (MCI March 2010)
- Suturing muscles
 - Arteriography
 - Pulmonary biopsy
 - Lymphangiography
138. All of the following complications may commonly follow lower extremity angiography except:
- Renal failure
 - Dehydration
 - Arterial occlusion
 - Intracerebral hemorrhage
139. Most common artery used for cannulation: (PGI June 97)
- Radial artery
 - Ulnar artery
 - Brachial artery
 - Cubital artery
140. Which is not true about femoral artery cannulation? (AIIMS May 2011)
- Common femoral artery is cannulated
 - Single wall puncture is indicated in those with normal coagulation profile
 - Femoral artery is catheterized at medial third of femoral head
 - Seldinger technique is used both for femoral artery and vein

TAKAYASU ARTERITIS

141. Bilateral pulseless disease in upper limbs is caused by: (PGI June 97)
- Aortoarteritis
 - Coarctation of aorta
 - Fibromuscular dysplasia
 - Buerger's disease
142. In Takayasu arteritis most common artery involved is: (JIPMER 2014)
- Common carotid artery
 - Subclaviary artery
 - Renal artery
 - Inferior mesenteric artery

MISCELLANEOUS

143. Allen's test is useful in evaluating: (APPG 2015, DNB 2011, All India 2006)
- Thoracic outlet compression
 - Presence of cervical rib
 - Integrity of palmar arch
 - Digital blood flow
144. The artery commonly involved in cirroid aneurysm is: (PGI 88)
- Occipital
 - Superficial temporal
 - Internal carotid
 - External carotid

145. True about erythrocyanosis except: (APPG 96)
- Affects young girls
 - Cold peripheries
 - Palpable pulses
 - Ulceration and gangrene of fingers
146. The Hunterian ligature operation is performed for: (Recent Question 2014; DNB 2003, AIIMS Nov 2008, All India 2003)
- Aneurysm
 - Varicose veins
 - AV fistulas
 - Acute arterial ischemia
147. Popliteal artery pulsations are difficult to feel because: (All India 2009)
- It is not superficial
 - It does not cross prominent bone
 - It is not superficial and does not cross prominent bone
 - Its pulsations are weak
148. The commonest cause of death following arterial reconstruction of the lower extremity is: (COMEDK 2004)
- Graft infection
 - Cerebrovascular accident
 - Myocardial infarction
 - Systemic sepsis secondary to skin necrosis
149. Saddle thrombus is present at: (Punjab 2008)
- Pulmonary artery
 - Aorta
 - Pulmonary vein
 - Bifurcation of pulmonary artery
150. Allen's test is used to diagnose: (JIPMER 2011)
- Thoracic outlet syndrome
 - Palmar arch insufficiency
 - Superior vena cava syndrome
 - Varicose veins
151. Mycotic aneurysm occurs due to: (MHSSMCET 2007)
- Fungus
 - Syphilis
 - Salmonella
 - Medial necrosis of arteries
152. In-situ thrombosis after drug-eluting stent insertion occurs owing to: (MHSSMCET 2008)
- Delayed re-epithelization
 - Premature termination of anti-platelet therapy
 - Disturbed coagulation
 - All of the above
153. Butcher's thigh is: (DNB 2010)
- Vastus lateral rupture
 - Subcutaneous lipodermatosclerosis
 - Bursa in adductor canal
 - Accidental injury to major vessels in thigh or groin
154. What is the best way to control external hemorrhage? (DNB 2012)
- Direct pressure
 - Elevation
 - Proximal tourniquet
 - Artery forceps
155. Which of the following is a feature of temporal arteritis? (AIIMS Nov 2012)
- Giant cell arteritis
 - Granulomatous vasculitis
 - Necrotizing vasculitis
 - Leucocytoclastic vasculitis
156. Which of the following is true about coeliac plexus block?
- Located retroperitoneally at the level of L3
 - Usually done unilaterally (AIIMS May 2013)
 - Useful for the painful conditions of lower abdomen
 - Most common side effect is diarrhea and hypotension

EXPLANATIONS

ARTERIAL OCCLUSION

1. Ans. a. Pulselessness, b. Paralysis, d. Anesthesia, e. Coolness

(Ref: Sabiston 19/e p1751; Schwartz 10/e p872-881, 9/e p754; Bailey 26/e p888, 25/e p899-901)

Peripheral Arterial Occlusion

- Clinical features of peripheral arterial occlusion are classically remembered by 5 Ps: **Pain, Pallor, Pulselessness, Paralysis and Paraesthesia** (or anesthesia)^Q
- Some add 6th P: **Poikilothermia** or **perishing cold**^Q
- MC presenting symptom of acute arterial occlusion: **Pain**^Q

2. Ans. None (Ref: Sabiston 19/e p1710-1718; Schwartz 10/e p872-881, 9/e p742-750; Bailey 26/e p837, 879 25/e p901)

Internal iliac artery doesn't supply lower limbs, so above-mentioned symptoms are not seen in the occlusion of internal iliac artery. External iliac artery occlusion can lead to symptoms in lower limb.

AORTOILIAC OCCLUSIVE DISEASE

- Distal abdominal aorta and iliac arteries are **common sites affected by atherosclerosis**^Q.
 - Symptoms and natural history of the atherosclerotic process are influenced by the disease distribution and extent.
- Presence of **pelvic and groin collaterals** is important in **providing crucial collateral flow in maintaining lower limb viability**^Q.
 - It is **rarely limb threatening**^Q (Opposite to femoropopliteal disease^Q)

Clinical Features

- Bilateral thigh or buttock claudication^Q
- Erectile dysfunction or impotence (Leriche syndrome^Q)
- Pulses distal to occlusion are absent or diminished
- Rest pain and gangrene are unusual with isolated segment of aortoiliac disease.
- Examination: **Weakened femoral pulses and reduced ABI**^Q.

Diagnosis

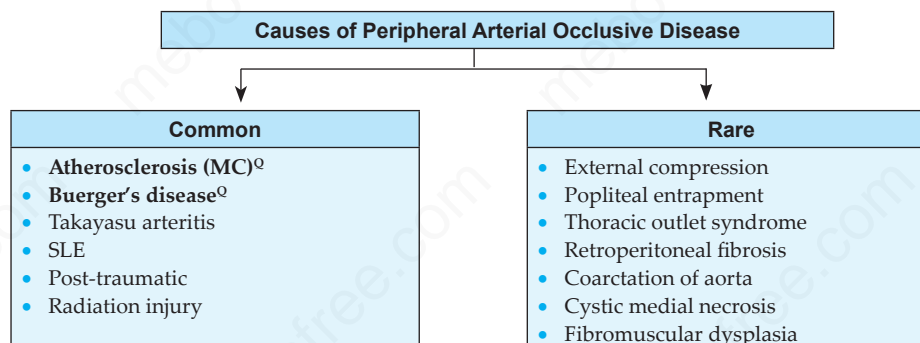
- Duplex ultrasound make the diagnosis of iliac occlusive disease
- Angiography is indicated if symptoms warrant **surgical intervention**^Q.

Treatment

- Failure to respond to exercise and/or drug therapy should prompt consideration for **limb revascularization**^Q.
- **Limb revascularization options:** Aortobifemoral bypass, aortic endarterectomy, axillofemoral bypass, iliofemoral bypass, femorofemoral bypass

3. Ans. b. Atherosclerosis (Ref: ASI Surgery/1333)

- ASI says "Most common cause of peripheral limb ischemia in adults in India is atherosclerosis^Q."

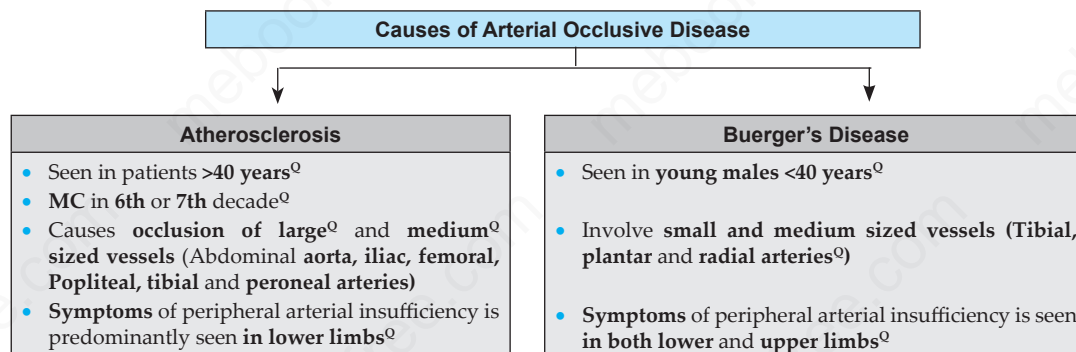


4. Ans. a. Shock

5. Ans. a. Cyanosis

6. Ans. b. Rubor

7. Ans. b. Atherosclerosis (Ref: Sabiston 19/e p1726, 1752, 1753; Schwartz 10/e p872-881, 9/e p753-754; Bailey 26/e p878, 25/e p899-901)



8. Ans. c. Removal of embolus form blood vessels (Ref: Sabiston 19/e p1751-1752; Schwartz 9/e p755-756; Bailey 26/e p890, 25/e p911)

FOGARTY BALLOON CATHETER

- Fogarty balloon catheter is used for removal of embolus form blood vessels^Q
- Embolectomy:**
 - Artery (usually the femoral), bulging with clot, is exposed and held in slings.
 - Through a longitudinal or transverse incision the clot begins to extrude and is removed, together with the embolus, with the help of a Fogarty balloon catheter^Q.
 - Catheter, with its balloon tip, is introduced both proximally and distally until it is deemed to have passed the limit of the clot.
 - Balloon is inflated and catheter withdrawn slowly, together with any obstructing material.
 - Procedure is repeated until bleeding occurs.

9. Ans. b. Removal of blood clots from the arteries

10. Ans. d. Gangrene localized to the feet

11. Ans. c. Pain in muscle on exercise only (Ref: Sabiston 19/e p1738; Schwartz 10/e p828, 882, 9/e p754-755; Bailey 26/e p878-879, 25/e p899-900)

- Intermittent Claudication: Crampy pain in muscles induced by exercise (walking) and relieved by rest.

INTERMITTENT CLAUDICATION

- Crampy pain in muscles that is:
 - Brought on by walking^Q (exercise)
 - Not present on taking the first step^Q (unlike osteoarthritis)
 - Relieved by standing still/rest^Q (unlike pseudoclaudication)

Boyd Classification of Intermittent Claudication

Grade	Characteristics
Grade 1	Pain starts but if the patient continues to walk, the metabolites increase the muscle flow and sweep away substance P produced by exercise and pain disappears ^Q .
Grade 2	Pain continues but the patient can still walk with effort ^Q
Grade 3	Pain compels the patient to take rest ^Q
Grade 4	Rest pain ^Q

12. Ans. c. Lumbar canal stenosis (Ref: Sabiston 19/e p1738; Schwartz 10/e p828,882, 9/e p753-755; Bailey 26/e p878-879, 25/e p923-924)

- When symptoms mimicking the symptoms of intermittent vascular claudication arise from lumbar canal stenosis, the condition is termed as neurogenic pseudoclaudication.
- Pseudoclaudication refers to a variety of conditions that may mimic vascular intermittent claudication. The condition that is most commonly confused with vascular intermittent claudication is neurological pseudoclaudication due to lumbar canal stenosis.

Characteristics	Vascular Claudication	Neurogenic Pseudoclaudication
Age	Old	Old
Gender	Male ^Q >female	Male=female
Current or previous low back pain	Less common	Very common ^Q
Lower Limb Symptoms:		
• Pain	Buttock, thigh, and/or leg ^Q	Buttock, thigh, and/or leg ^Q
• Numbness, tingling (Paraesthesias)	No / Rare	Frequent
• One or both sides	Yes (May be unilateral)	Yes (Usually bilateral ^Q)

Provoking Factors: <ul style="list-style-type: none"> Walking / Exercise Standing still Up an incline Down an incline 	Yes^Q No ± More likely^Q ± Less likely	Yes^Q Yes^Q ± Less likely ± More likely^Q
Relieving Factors: <ul style="list-style-type: none"> Stand still Lean forwards (flexed posture) 	Helps^Q No difference	No help Helps^Q
Preventive Factor: <ul style="list-style-type: none"> Time to relief Pulses Neurological examination Straight - leg raising test 	Slightly quicker^Q (2-5 minutes to disappear) Reduced^Q Normal Negative	Slightly slower^Q (15-20 minutes to disappear) Normal Minor findings^Q Usually negative
Walking distance	Fairly constant^Q	More variable

13. Ans. b. Superior thoracic artery (Ref: BDC 4/e pool I/56, 82)

A rich anastomosis exists around the scapula between branches of subclavian artery (first part) and the axillary artery (third part). This anastomosis provides a collateral circulation through which blood can flow to the limb when the distal part of subclavian artery or the proximal part of axillary artery is blocked.

Anastomosis around Scapula
<ul style="list-style-type: none"> Formed by branches of: <ul style="list-style-type: none"> First part of subclavian artery^Q (Suprascapular^Q and deep branches of transverse cervical artery^Q) Third part of axillary artery^Q (Subscapular and its circumflex scapular branch^Q)

14. Ans. a. Antiphospholipid antibodies, c. Hyperhomocysteinemia (Ref: Harrison 18/e p462; Sabiston 19/e p1813; Schwartz 9/e p754, 781)

Abnormality	Arterial Thrombosis	Venous Thrombosis
Factor V Leiden ^Q	-	+
Prothrombin	-	+
Antithrombin III	-	+
Protein C	-	+
Protein S	-	+
Homocystinemia ^Q	+	+
Antiphospholipid syndrome ^Q	+	+

15. Ans. d. 2 hours (Ref: Bailey 25/e p206-207)

- Excessive tourniquet time causes both local pressure and distal ischemic effects, with nerve damage and even compartment syndrome.
- Tourniquets should usually be let down after 1 hour^Q unless close to the end of a procedure.
- They can then be reinflated after 5-10 min for a further hour^Q.

- Tourniquet time for upper limb: 1 hour^Q
- Maximum tourniquet time for upper limb: 2 hours^Q

16. Ans. b. Bilateral iliac artery occlusion (Ref: Sabiston 19/e p1727-1728; Schwartz 9/e p753; Bailey 26/e p879, 25/e p901)

Site of Block	Clinical Presentation
Aorto-iliac disease	<ul style="list-style-type: none"> Buttock, thigh and calf claudication^Q Leriche syndrome^Q
Common femoral disease	<ul style="list-style-type: none"> Thigh and calf claudication^Q
Superficial femoral disease	<ul style="list-style-type: none"> Calf claudication^Q
Popliteal artery disease	<ul style="list-style-type: none"> Calf claudication^Q
Crural artery disease	<ul style="list-style-type: none"> Calf claudication^Q

17. Ans. a. Embolectomy (Ref: Sabiston 19/e p1751-1752; Schwartz 9/e p752-756; Bailey 26/e p888-891, 25/e p909-911)

EMBOLIC OCCLUSION

- An embolus is detached thrombus from heart or a more proximal vessel.
- MC Source: Left atrium in atrial fibrillation^Q > Mural thrombus following MI^Q
- Less common sources: Aneurysms and thrombi formed on atheromatous plaques

Emboli cause Ischemic Symptoms	
Leg	• Pain, pallor, paresis, pulselessness and paraesthesia ^Q
Brain	• TIA or stroke ^Q
Retina	• Amaurosis fugax
Mesenteric vessels	• Possible gangrene of corresponding loop of intestine ^Q
Spleen	• Local pain
Kidneys	• Loin pain and hematuria

Clinical Features

- Embolitic arterial occlusion is an emergency that requires immediate treatment^Q.
- The leg is often affected, with pain, pallor, paresis, loss of pulsation and paraesthesia (or anesthesia).

Diagnosis can be made clinically^Q in a patient who has no history of claudication and has a source of emboli, who suddenly develops severe pain or numbness of the limb, which becomes cold and mottled^Q.

- Movement becomes progressively more difficult and sensation is lost^Q.
- Pulses are absent distally^Q but the femoral pulse may be palpable.

Treatment

- Because of the ensuing stasis, a thrombus can extend distally and proximally^Q to the embolus.

Immediate administration of 5000 U of heparin IV can reduce this extension and maintain patency of the surrounding (particularly the distal) vessels until the embolus can be treated^Q.

- The relief of pain is essential because it is severe and constant.

Embolectomy and thrombolysis^Q are the treatments available for limb emboli.

18. Ans. b. Arterial insufficiency 19. Ans. c. Immediate embolectomy
 20. Ans. c. Dextran-40 pmj.bmj.com/content/70/819/5.full.pdf
 • Dextran-40 or 70 to reduce plasma viscosity can be given in the management of the ischemic limb for temporary improvement^Q.
 • Low molecular weight dextrans are used during acute attack of thromboangitis. They cause hemodilution, decrease viscosity of blood and improve microcirculation. Intra-arterial injection is said to be more effective than intravenous^Q.
 21. Ans. b. Muscles are unaffected 22. Ans. a. 1 hour

BUERGER'S DISEASE

23. Ans. b. Endovascular stent, d. Extra-anatomical bypass (Ref: Sabiston 19/e p1752-1753; Schwartz 10/e p906, 1822-1823, 9/e p771; Bailey 26/e p899-900, 25/e p923-924)

BUERGER'S DISEASE (THROMBOANGITIS OBLITERANS)

- Segmental inflammatory disease^Q, affecting small and medium sized^Q arteries in upper and lower^Q extremities
- Inflammatory process involves neighboring veins and nerves^Q
- Definite relationship with smoking^Q

Histopathology

- Sharply segmental acute and chronic vasculitis of small and medium vessels with thrombosis of lumen which may undergo organization and recanalization^Q
- Thrombus contains microabscesses

- Inflammatory process extends to involve neighboring veins and nerves^Q
- With time, all three structures (artery, vein and nerve) become incased in fibrous tissue^Q

Clinical Features (RIM)

- Characterized by triad of intermittent claudication, Raynaud's phenomenon and migratory superficial vein thrombophlebitis^Q
- Typically seen in young (<40 years), male smokers^Q

- Not seen in females and non-smokers^Q
- Patient initially presents with **foot, leg, arm or hand claudication** progressing to **rest pain and ulcerations** on the toes, feet or fingers

- TAO principally affects **distal (small + medium) vessels**^Q, so **claudication** is usually confined to **calves and feet or forearm and hands**

Diagnosis

- Angiography of all four limbs^Q (multiple limbs may be involved)
- Even if symptoms are not yet present in a limb, angiographic findings may be demonstrated.
 - **Characteristic angiographic findings:** Disease confinement to the distal circulation, usually **infrapopliteal and distal to the brachial artery**^Q.
 - Occlusions are **segmental** and show “skip” lesions with extensive collateralization, the so-called “corkscrew collaterals”^Q.

Diagnosis

- **Abstinence from smoking**^Q arrests, but does not reverse, the disease.
- **Sympathectomy** for **rest pain and ulcerations**^Q
- **Omental transposition**^Q
- **Amputations**^Q in gangrene

Surgical bypass or revascularization is rarely feasible in Buerger's disease, because of:

1. **Occlusion of small and medium sized vessels**^Q
2. Presence of **segmental and skip lesions**^Q
3. **Absence of distal target vessel for bypass**^Q

24. Ans. b. Pain in positional
- Relief of symptoms is not dependent upon sitting or other positional changes in intermittent claudication.
25. Ans. d. Thromboangitis obliterans
26. Ans. a. Small and medium sized vessels involved, c. Common in male
27. Ans. a. Xanthinol nicotinate ([Ref: en.wikipedia.org/wiki/Xanthinol_nicotinate](http://en.wikipedia.org/wiki/Xanthinol_nicotinate))

Xanthinol Nicotinate

- Xanthinol nicotinate (or xanthinol niacinate or complamina) is a vasodilator^Q.
- It is a combination of **xanthinol** and **niacin (nicotinic acid)**^Q.
- This vasodilator is **used** in the treatment of Raynaud's phenomenon and **Buerger's disease**.

- Other than the experimental use of **iloprost (prostacyclin or PGI₂)** and **thrombolytics**, the use of **antibiotics** to treat infected ulcers, and **palliative treatment of ischemic pain** with **nonsteroidal and narcotic analgesics**, **all other forms of pharmacologic treatment** have been generally **ineffective** in the treatment of Buerger's disease, including **steroids**, **calcium channel blockers**, **reserpine**, **pentoxifylline (Trental)**, **vasodilators**, **antiplatelet drugs**.

28. Ans. c. Large arteries
29. Ans. c. Buerger's disease
30. Ans. b. Neural involvement present ([Ref: Robbins 8/e p517; Sabiston 19/e p1752-1753; Schwartz 9/e p771; Bailey 25/e p923-924; Harrison 18/e p2069](#))
31. Ans. a. More in night, b. MC in calf muscle, c. Increase upon elevation of limbs, d. Relieved by dependent position, e. Often associated with trophic changes ([Ref: Sabiston 19/e p1738; Schwartz 9/e p753; Bailey 26/e p878, 25/e p923-924](#))

ISCHEMIC REST PAIN

- **Ischemic rest pain** is a **grave symptom** caused by **ischemic neuritis**^Q
- Indicates advanced **arterial insufficiency** that usually terminates in **gangrene and amputation of the extremity** if arterial reconstruction cannot be performed.

- Burning pain usually confined to the forefoot, distal to the metatarsals^Q.
- It may be localized to the vicinity of an ischemic ulcer or pregangrenous toe.

- It is aggravated by elevation of the extremity or by bringing the leg to the horizontal position^Q.
- Thus it appears at bed rest (hence the name) and prevent sleep^Q.
- Because gravity aids the delivery of arterial blood, classically, the patient with rest pain can obtain relief by simply hanging the leg over the side of the bed^Q.
- This simple maneuver will not relieve pain caused by peripheral neuropathy, the most common cause of foot pain at rest^Q.

- If the foot is constantly kept dependent to relieve pain, the leg and foot may be swollen, causing some confusion in diagnosis.
- Ischemic neuritis pain is severe and resistant to opioids for relief^Q.
- Rest pain occurs when blood flow is inadequate to meet metabolic requirements^Q.
- In the lower extremity, ischemic rest pain is localized to the forefoot and generally is easily distinguished from benign nocturnal muscle cramps in the calf, which are also common in older patients.
- Patients often have trophic changes, such as muscle wasting, thinning of skin, thickening of nails, and hair loss in the distal affected limb^Q.

32. Ans. d. Anterior and posterior tibial artery

34. Ans. d. Femoropopliteal bypass

36. Ans. c. Absence of popliteal pulse

38. Ans. a. Lymphatics

41. None

39. Ans. c. Myocardial infarction

42. Ans. b. Anticoagulation

33. Ans. d. Thromboangitis obliterans

35. Ans. d. Veins and nerves are never involved

37. Ans. a. Smoking, e. Superficial thrombophlebitis

40. Ans. a. Only male, b. Age less than 40, d. Smoker

LUMBAR SYMPATHECTOMY

43. Ans. a. Intermittent claudication (Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 25/e p924)

- Lumbar sympathectomy is not of value in the management of intermittent claudication, as blood flow in the skin but not in the muscle is controlled by sympathetic nervous system.

- Blood flow in the skin but not in the muscle is controlled by sympathetic nervous system^Q.
- If the overlying arterial supply is inadequate, ischemic changes in the skin may be relieved by sympathetic blockage but the impaired blood flow to muscles is unlikely to improve^Q.

Indications of Sympathectomy (BARA CHEF)

- | | |
|---|--|
| <ul style="list-style-type: none"> • Buerger's disease^Q • Atherosclerosis producing ischemia of limbs^Q • Raynaud's disease^Q • Acrocyanosis^Q | <ul style="list-style-type: none"> • Erythrocyanosis^Q • Frost bite^Q • Hyperhydrosis^Q • Peripheral vascular insufficiency • Causalgia^Q |
|---|--|

44. Ans. b. Distal ischemia affecting the skin of the toes (Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 25/e p924)

- Lumbar sympathectomy is indicated in the management of distal ischemia affecting skin of the toes.
- Arteriovenous fistula, back pain and intermittent claudication are not included amongst the indications for lumbar sympathectomy.

- MC indication of sympathectomy is ischemic disorders mainly of the limbs^Q.
- MC ischemic condition for which sympathectomy is carried out is peripheral vascular occlusive disease of the young male smokers^Q.
- Lumbar sympathectomy is not of value in the management of intermittent claudication^Q

45. Ans. b. Intermittent claudication c. Anhidrosis (Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 26/e p900, 25/e p924)

- Sympathectomy is used for the treatment of hyperhydrosis. It would worsen anhidrosis rather than treating it.

46. Ans. a. L1 (Ref: Sabiston 19/e p1903; Bailey 25/e p924)

LUMBAR SYMPATHECTOMY

- Open sympathectomy is done preferably through extraperitoneal approach^Q.
- The sympathetic chain lies on the sides of the body of vertebra, sometimes inside psoas muscle sheath.

- In **unilateral surgeries**, sympathetic ganglia **L1, L2, L3** and sometimes **L4** are removed^Q.
 - In **bilateral surgeries**, **L1 of one side** is **preserved** to avoid retrograde ejaculation^Q.
- Lumbar chain can be mistaken with lymphatic chain, genitofemoral nerve, psoas sheath, psoas minor leading to technical failure^Q.

47. Ans. a. Intermittent claudication 48. Ans. b. Claudication 49. Ans. b. Hyperhydrosis
 50. Ans. c. A+B 51. Ans. b. Psoas minor, c. Genitofemoral nerve, e. Lymphatics
 52. Ans. c. Sterility

CRITICAL LIMB ISCHEMIA

53. Ans. d. Smoking is more specific for peripheral vascular disease than coronary artery disease (Ref: Harrison 18/e p2067; Sabiston 19/e p1730; Schwartz 10/e p881-900, 9/e p751; Bailey 26/e p878, 25/e p900-902)

- Smoking is equally related with coronary artery disease and peripheral vascular disease^Q.
- Ankle brachial index <0.5 indicates **critical limb ischemia**^Q.
- Exercise normally increases systolic pressure and decreases peripheral vascular resistance. In case of PAD, it augments the pressure gradient across a stenotic lesion. Thus exercise helps in detecting low grade stenotic lesion giving normal ABI at rest (ABI changes during exercise and rest^Q)
- ABI >1 is normal^Q.

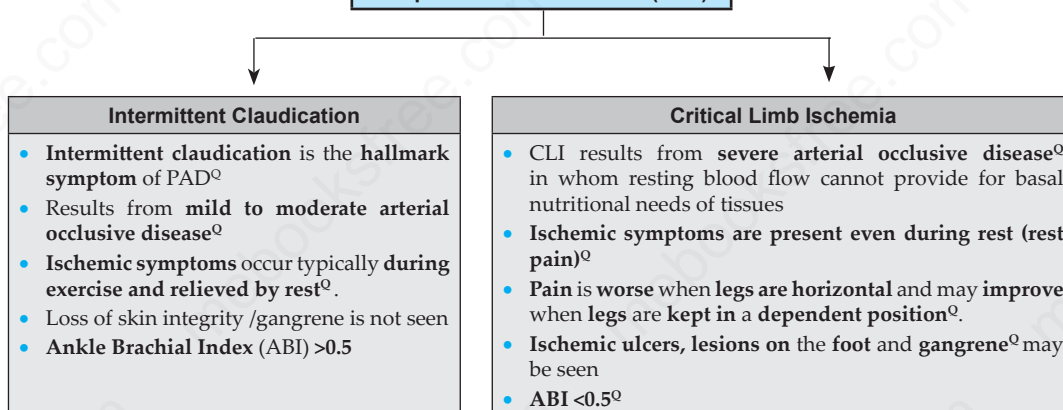
ANKLE BRACHIAL INDEX (ABI)

- ABI = Systolic BP at the ankle / Systolic BP in the arms
- Compared to the arm, **lower blood pressure in the leg** is an indication of blocked arteries (peripheral vascular disease).
- ABI is calculated by dividing the systolic blood pressure at the ankle by the systolic blood pressures in the arm.

ABI	Interpretation
>1.2	Noncompressible, severely calcified vessel (in DM and ESRD) ^Q
1.0-1.2	Normal vessels ^Q
0.5-0.9	Intermittent claudication ^Q (mild to moderate ischemia)
0.1-0.4	Critical limb ischemia ^Q (Ischemic ulceration, gangrene)

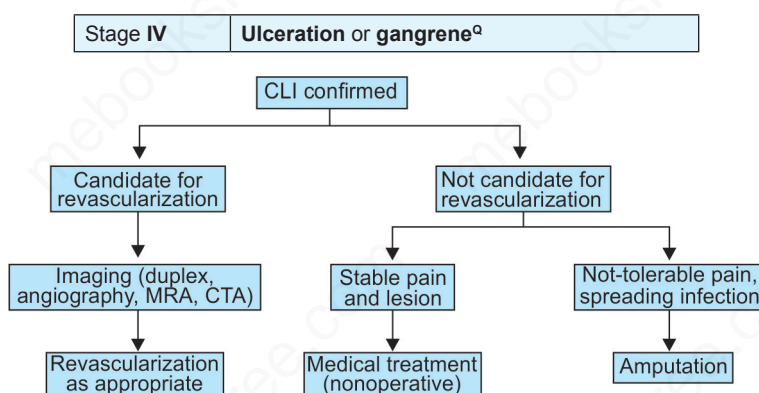
54. Ans. c. Rest pain and ischemic ulcers (Ref: Harrison 18/e p2067; Sabiston 19/e p1738-1739; Schwartz 10/e p881-900, 9/e p751-753; Bailey 26/e p878, 25/e p900-902)
- Critical lower limb ischemia is characterized by rest pain. Ulcers and gangrene may occur in patients with critical limb ischemia.

Peripheral Arterial Disease (PAD)



Fontaine Classification of Limb Ischemia

Stage I	Asymptomatic ^Q
Stage IIa	Mild claudication ^Q
Stage IIb	Moderate to severe claudication ^Q
Stage III	Ischemic rest pain ^Q



55. Ans. b. 0.3

56. Ans. a. Rest/Night pain

57. Ans. b. 1

58. Ans. a. < 0.3

ARTERIAL ULCER

59. Ans. b. Elevation of limb (Ref: Schwartz 9/e p224-225; Bailey 26/e p878, 917, 25/e p933-935)

Because **gravity** aids the **delivery** of arterial blood, classically, the patient with rest pain can obtain **relief** by simply **hanging** the leg over the side of the bed.

ARTERIAL ULCER

- Arterial insufficiency ulcers **ischemic ulcers** are mostly located on the **lateral surface** of the ankle or the **distal digits**^o.
- Most common on **distal ends** of limbs^o.

Etiology

- Caused by **lack of blood flow** to the capillary beds of the lower extremities.
- Most often **endothelial dysfunction** is causative factor in **diabetic microangiopathy** and **macroangiopathy**^o

Characteristic Features

- **Punched-out appearance**^o
- **Intensely painful**^o
- **Pulses are not palpable**^o
- Associated **skin changes** (thin shiny skin, absence of hair, brittle nails^o)

Diagnosis

- The lesion can be easily identified clinically.
- **Arterial doppler** and **pulse volume recordings** for baseline assessment of blood flow.
- **Radiographs** may be necessary to **rule out osteomyelitis**.

Treatment

- **Vascular surgery** to revascularize the area.
- In infection: **Antibiotics + Debridement**^o

60. Ans. b. Elevation of the affected extremity

AMPUTATION

61. Ans. a. 6 hours (Ref: Essential Emergency Trauma by Kaushal Shah, Daniel Egan, Joshua Quaas– 2010/679)

- **Ischemic time** for digits is **upto 8 hours**^o.
- **Ischemic time** for **extremities** is **4-6 hours**^o.
- **Organ containing bag** should be placed in a solution of **saline with ice**^o.

62. Ans. None > d (Ref: Analgesics www.stoppain.org/pain_medicine/content/chronicpain/phantom.asp)

STUMP PAIN

- Stump pain is **located at the end** of an **amputated limb's stump**.
- It typically is described as a **"sharp," "burning," "electric-like,"** or **"skin-sensitive" pain**.
- Due to a **damaged nerve** in the **stump region**.

Treatment

- **No one treatment** has been shown to be effective for **stump pain**^Q.
- Because it is a pain due to an injured peripheral nerve, **drugs used for nerve pain may be helpful**.
 - Other approaches also are tried in selected cases, including:
 - **Nerve blocks**^Q
 - **Transcutaneous electrical nerve stimulation**^Q
 - **Surgical revision** of the stump or **removal of the neuroma**^Q
 - **Cognitive therapies**

63. Ans. d. Isotonic saline

64. Ans. a. Law of projection (Ref: Ganong 22nd/125)

- A phantom limb is the sensation that an **amputated or missing limb** (even an organ appendix) is **still attached to the body** and is moving appropriately with other body parts based upon **"Law of Projection"**.
- It states that no matter where a sensory pathway is stimulated along its course, the sensation produced is referred back to site of receptor.

ARTERIOVENOUS FISTULA

65. Ans. d. Branham sign (Ref: Sabiston 19/e p1785-1786; Bailey 26/e p899, 25/e p923)

ARTERIOVENOUS FISTULA (AVF)

- AVF (communication between an **artery** and **vein**) may be **congenital or acquired** (penetrating trauma or surgically created for hemodialysis)

- **MC type of AVF: Congenital**^Q
- **MC cause of acquired AVF: Penetrating trauma**^Q

- **Structural effects on veins:** Veins are **arterialized** (become **dilated, tortuous** and **thick walled**)^Q

Physiological Effects of AVF

- **Increased pulse pressure**^Q (Increased systolic and decreased diastolic)
- **Increased venous return** leading to **increased HR** and **increased CO**^Q
- **Left ventricular enlargement**^Q and later **cardiac failure**^Q may occur

- A **congenital fistula** in the young patient may cause **overgrowth of the limb**^Q
- In the leg **indolent ulcers** may result from **relative ischemia below the short circuit**^Q

Clinical Signs

- A **pulsatile swelling**^Q
- **Thrill** on palpation^Q
- **Continuous bruit** on auscultation^Q

- **Nicoladoni's or Branham's sign:** Pressure on artery **proximal to fistula** causes the swelling to diminish in size, a thrill or bruit to cease, the pulse rate to fall and the pulse pressure returns to **normal**^Q.

Diagnosis

- **Duplex scan** and/or **angiography** confirm the diagnosis^Q.

Treatment

- Treatment is by **embolization**^Q.
- **Excisional surgery** (rarely) for **severe deformity** or **recurrent hemorrhage**^Q.

66. Ans. b. Proximal compression causes increases in heart rate

67. Ans. b. AV fistula

68. Ans. a. Leads to cardiac failure, b. Causes local gigantism, c. Can cause ulcers, d. Causes excess bleeding on injury
 69. Ans. a. Leads to cardiac failure, b. Causes local gigantism, d. Local ulceration and hemorrhage
 70. Ans. a. Compression cause bradycardia
 71. Ans. d. Penetrating trauma 72. Ans. a. Congenital
 73. Ans. b. Increased skin temperature 74. Ans. d. Necrosis of the distal part
 75. Ans. a. Allen's test (Ref: Sabiston 19/e p1956; Bailey 25/e p437)

ALLEN'S TEST

- Tests the adequacy of the blood supply to the hand from the radial and ulnar arteries and the arcade between them^Q
- Allen's test is used to know the integrity of palmar arch (patency of radial and ulnar arteries)^Q. If these are patent, AVF can be safely ligated.

Method of Allen's Test

- Elevate the hand and apply digital pressure on the radial and ulnar arteries to occlude them.
- Ask the patient to make a fist several times.
- The tips of the finger should go pale. Release each artery in turn and observe the return of colour

Types of Surgically Created Fistula

Brescia-Cimino Fistula	• Radial artery and cephalic vein ^Q
Snuffbox Fistula	• Posterior branch of Radial artery and cephalic vein
Feinberg Fistula	• Radial artery and basilic vein ^Q

THORACIC OUTLET SYNDROME

76. Ans. a. Clinical evaluation (Ref: Sabiston 19/e p1594-1595; Schwartz 10/e p829, 928, 9/e p704, 790; Bailey 26/e p872, 25/e p895)
- Thoracic outlet syndrome is diagnosed primarily by clinical evaluation and the diagnosis is based on reproducibility of symptoms (resulting from compression of neurovascular bundle at the thoracic outlet) during mechanical provocative maneuvers (Adson's test or costoclavicular test or Hyperabduction test or Roos Arm Claudication test)
 - Specific investigations (CT scan, MRI, Angiography, X-ray) are used to exclude other conditions and to establish the associated diagnosis.

THORACIC OUTLET COMPRESSION SYNDROME (TOS)

- TOS refers to compression of subclavian vessels and nerves of the brachial plexus in the region of the thoracic inlet^Q.
- Divided into: Vascular forms (Arterial and/or Venous) and Neurogenic forms
- Compression resulting from TOS is dynamic and best evaluated clinically by mechanical provocative maneuvers^Q

- Symptoms most commonly develop secondary to neural compromise^Q
- Middle-aged women^Q are most commonly affected

Neurovascular structures of the upper extremity may be compressed by

<ul style="list-style-type: none"> • Cervical rib^Q • Long transverse process of C7^Q • Abnormal first rib^Q • Osteoarthritis • Scalenes muscle^Q 	<ul style="list-style-type: none"> • Trauma (neck hematoma, bone dislocation^Q) • Fibrous bands^Q (congenital and acquired) • Neoplasms^Q
--	--

Clinical Features

- Symptoms vary depending on the anatomic structure that is compressed^Q.
- In > 90% of cases, neurogenic manifestations are reported^Q.

- Ulnar nerve (C8-T1) involvement is most common^Q.
- It is associated with:
 - Motor weakness and atrophy of the hypothenar and interosseous muscles^Q
 - Pain and paresthesia along the medial aspect of the arm, hand, 5th finger and medial aspect of 4th finger^Q.

- Symptoms of **subclavian artery compression**: Fatigue, weakness, coldness, ischemic pain, and paresthesia. **Thrombosis with distal embolization** rarely can occur, producing vasomotor symptoms (**Raynaud's phenomenon**) in the hand or **ischemic changes**^Q.
- **Venous compression**: Edema, venous distention, collateral formation, and cyanosis of the affected limb^Q

Diagnosis

- **Compression** resulting from TOS is **dynamic** and **best evaluated clinically by mechanical provocative maneuvers**^Q
- **Specific investigations** (CT scan, MRI, Angiography, X-ray) are used to **exclude other conditions** and to **establish the associated diagnosis**^Q.

Treatment

- Approx. 50-90% of patients can be **successfully treated by improvements in postural sitting, standing and sleeping positions, behavior modification at work and muscle stretching and strengthening exercises**^Q.

Indications for Surgical Intervention

- **Failure of conservative management**^Q
- **Progression of sensory or motor symptoms**^Q
- Presence of **excessively prolonged ulnar or median nerve conduction velocities**^Q
- **Narrowing or occlusion of the subclavian artery**^Q
- **Thrombosis of the axillary or subclavian vein**^Q

- **Operation for TOS**: Complete removal of the **first rib**, with **division of scalenus anticus and medius**^Q.
- **Large aneurysms or thrombosis of the subclavian artery**: **Graft reconstruction**^Q
- **Subclavian vein thrombosis**: **Thrombolytic and anticoagulant therapy** and simultaneous **surgical decompression**^Q.

Provocative Clinical Tests to establishing the diagnosis of Thoracic Outlet Syndrome (TOS)

Provocative Test	Instruction	Inference
Adson's Test^Q (Scalene Test)	Patient is instructed to: <ul style="list-style-type: none"> • Take a deep breath and hold it • Extend the neck fully • Turn face towards the side 	<ul style="list-style-type: none"> • Maneuver tightens the anterior and middle scalene muscles, thus decreasing the interscalene space and magnifying any preexisting compression. • Obliteration or diminution of radial pulse suggests the diagnosis
Costoclavicular Test^Q (Military Position)	Patient is instructed to: <ul style="list-style-type: none"> • Draw shoulders downwards and backwards 	<ul style="list-style-type: none"> • Maneuver narrows the costoclavicular space by approximating the clavicle to the first rib thus tending to compress the neurovascular bundle • Obliteration of radial pulse or reproduction of symptoms indicates compression
Hyperabduction Test^Q	Patient is instructed to: <ul style="list-style-type: none"> • Hyperabduct (Raise) the arm to 180° 	<ul style="list-style-type: none"> • Maneuver causes the neurovascular structures to be pulled around the pectoralis minor tendon, coracoid process and head of humerus • Obliteration or diminution of radial pulse suggests the diagnosis
Roos Test^Q (Arm Claudication Test)	Patient is instructed to: <ul style="list-style-type: none"> • Draw shoulders backwards • Rise arms to horizontal position with elbows flexed to 90° • Exercise the hands 	<ul style="list-style-type: none"> • Numbness or pain in the hands with exercise suggests the diagnosis

77. Ans. c. Lymphocutaneous fistula (Ref: Sabiston 19/e p1595; Bailey 26/e p872, 25/e p895)

Brachial plexus injuries, vascular injuries, pleural effusion, winged scapula, and infection are complications that may arise secondary to first rib removal.

Complications of Surgical Treatment of TOS

- | | |
|--|---|
| <ul style="list-style-type: none"> • Brachial plexus injuries^Q • Winged scapula due to long thoracic nerve injury^Q • Horner's syndrome^Q • Vascular injuries (subclavian vessels^Q) | <ul style="list-style-type: none"> • Pleural effusion^Q • Pneumothorax^Q • Air embolism • Infection |
|--|---|

78. Ans. c. Cervical rib

79. Ans. a. Radial nerve is commonly affected

80. Ans. a. Most commonly radial nerve 81. Ans. c. Pain in ulnar distribution

82. Ans. b. Wasting of forearm muscles (Ref: Sabiston 19/e p1594-1595; Schwartz 9/e p704, 790; Bailey 25/e p895)

Muscles of hand are wasted, not the forearm muscles.

- Ulnar nerve (C8-T1) involvement is most common^Q.
- It is associated with:
 - Motor weakness and atrophy of the hypothenar and interosseous muscles^Q
 - Pain and paresthesia along the medial aspect of the arm, hand, 5th finger and medial aspect of 4th finger^Q.

83. Ans. c. Cervical rib

84. Ans. b. 25–45 years

RAYNAUD'S DISEASE

85. Ans. b. Migratory thrombophlebitis is seen only in Raynaud's phenomenon (Ref: Harrison 18/e p2071; Sabiston 19/e p1752; Schwartz 10/e p1823, 9/e p1642; Bailey 26/e p900, 25/e p924)

RAYNAUD'S PHENOMENON

- Raynaud's phenomenon is characterized by episodic digital ischemia on exposure to cold or emotional stress^Q
- Manifested by the sequential development of digital blanching, cyanosis and rubor (redness) of fingers or toes^Q
- BCR: Blanching, Cyanosis and Rubor (redness)

Triphasic Color Response Include Three Stages	
Blanching^Q (stage of local syncope)	<ul style="list-style-type: none"> • With exposure to cold, digital arterioles goes into spasm • Decreased flow is evidenced by pallor or blanching • Digits may appear white
Cyanosis^Q (stage of local asphyxia)	<ul style="list-style-type: none"> • Capillaries and venules dilate • Cyanosis results from deoxygenated blood present in these vessels
Red Engorgement^Q (stage of recovery)	<ul style="list-style-type: none"> • With rewarming or passing of attack, the digital vasospasm resolves • Blood flow into dilated arteries and capillaries increases dramatically • Reactive hyperemia imparts bright red color to the digits • In addition to rubor and warmth, patient often experiences a throbbing, painful sensation during the hyperemic phase

- Raynaud's phenomenon is divided into:
 - Primary or idiopathic (Raynaud's disease^Q)
 - Secondary (associated with other diseases)

Associations

- Raynaud's phenomenon occurs frequently in patients who also have migraine or variants angina^Q. These associations suggest a common predisposing cause for vasospasm^Q.
- Occupational groups that use vibrating tools are more predisposed
- Sclerodactyly^Q (thickening and tightening of digital subcutaneous tissue) may develop in few patients.

86. Ans. b. More common in female, d. Associated with migraine

(Ref: Harrison 18/e p2071-2072; Sabiston 19/e p1752; Schwartz 9/e p1642; Bailey 26/e p900, 25/e p924)

RAYNAUD'S DISEASE

- Diagnosis of Raynaud's disease is made when the secondary causes of Raynaud's phenomenon are ruled out^Q.
- Majority (70-90%) of patients are young women^Q <40 years of age.
- Geographic regions located in cooler, damp climates have a higher reported prevalence^Q.

Characteristic Features

- Fingers^Q are involved more commonly than toes.
- On examination, patient is entirely normal.
- Radial, ulnar and pedal pulses are normal^Q.

Treatment

- There is no cure, all treatments mainly palliate symptoms and decrease the severity and, perhaps, frequency of attacks^Q.
- Majority (90%) of patients will respond to avoidance of cold and other stimuli^Q.
- Remaining 10% of patients can be treated with a variety of vasodilatory drugs
- CCBs such as diltiazem and nifedipine are the drugs of choice^Q.

87. Ans. c. Osteoarthritis

88. Ans. b. White, blue, red

89. Ans. c. Turn white

90. Ans. d. Atherosclerosis of vessels

DIABETIC FOOT

91. Ans. a. Strict diabetic control, c. Topical antibiotics are used, e. Diabetic ulcers are trophic ulcers (Ref: Harrison 18/e p2987; Sabiston 19/e p1738-1740; Schwartz 10/e p1877, 1879, 9/e p1693; Bailey 26/e p549, 887, 25/e p913)

DIABETIC FOOT

- Diabetic foot is related to:
 - Trophic changes from peripheral neuropathy^Q
 - Ischemia as a result of microangiopathy and macroangiopathy (atherosclerosis)^Q
 - Low resistance to infection^Q because of excess sugar in the tissues
- Neuropathy (stocking-and-glove distribution^Q) impairs sensation and favours the neglect of minor injuries and infections.
- Motor involvement is frequently accompanied by loss of reflexes and deformities (neuropathic joints).
- Thick callosities on the sole and amateur chiropody may allow the entry of infection.
- Any infection can spread proximally with speed in subfascial planes in diabetic patients.

Clinical Features

- Diabetic ulcers are usually found on the plantar surface of the foot over the metatarsal heads or heel^Q.
- Edema is usually mild with no change in surrounding pigmentation.

Treatment

- Treatment consists of bringing the diabetes under control by diet and drugs^Q.
 - Necrotic tissue must be judiciously débrided, and topical antimicrobials are needed to control local infection^Q.
- In some cases, resection of the underlying bony prominence may improve wound healing.

92. Ans. c. Heel, d. Head of metatarsal

93. Ans. d. All of the above

94. Ans. a. Vasospasm

95. Ans. a. Myelopathy

AORTIC DISSECTION

96. Ans. a. Right lateral wall of ascending aorta

(Ref: Harrison 18/e p2063; Sabiston 19/e p1718-1720; Schwartz 10/e p806-816, 9/e p684-695; Bailey 26/e p846, 25/e p873-874)

AORTIC DISSECTION

- Aortic dissection is caused by a circumferential or, less frequently, transverse tear of the intima.
- MC site: Right lateral wall of the ascending aorta^Q
- Another common site: Descending thoracic aorta (just below the ligamentum arteriosum).
- Peak incidence: 6th and 7th decades.^Q
- Men^Q are more commonly affected

Predisposing Factors

- | | |
|---|--|
| <ul style="list-style-type: none"> Systemic hypertension^Q Cystic medial necrosis^Q Marfan syndrome Ehlers-Danlos syndrome Bicuspid aortic valve | <ul style="list-style-type: none"> Takayasu's arteritis Giant cell arteritis Coarctation of the aorta History of aortic trauma Third trimester of pregnancy^Q |
|---|--|

Classification

DeBakey Classification

Type I	Intimal tear in ascending aorta, involving descending aorta ^Q
Type II	Dissection limited to ascending aorta ^Q
Type III	Intimal tear in descending aorta with distal propagation of the dissection ^Q

Stanford Classification	
Type A	• Dissection involves ascending aorta (proximal dissection) ^Q
Type B	• Limited to the descending aorta (distal dissection) ^Q

Clinical Features

- Acute aortic dissection: **Sudden onset of pain**, very severe and tearing, associated with diaphoresis.
 - Pain may be localized to the **front or back of the chest**, often the **interscapular region**, and typically **migrates with propagation of the dissection**^Q.
- Other symptoms: **Syncope, dyspnea, and weakness**^Q.
- Physical findings: Hypertension or hypotension, **loss of pulses, aortic regurgitation, pulmonary edema**, and **neurologic findings** due to carotid artery obstruction (hemiplegia, hemianesthesia) or **spinal cord ischemia** (paraplegia)^Q.
- Signs of aortic regurgitation: **Bounding pulses, a wide pulse pressure, a diastolic murmur** often radiating along the right sternal border, and evidence of CHF^Q.
 - Ascending aorta dissection: **widened superior mediastinum on Chest x-ray**^Q
 - Pleural effusion (usually left-sided), typically **serosanguineous** is seen^Q.

97. Ans. a. Acute aortic dissection

98. Ans. b. Aorta

AORTIC ANEURYSM

99. Ans. a. Atherosclerosis (Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1697; Schwartz 10/e p850-859, 9/e p723; Bailey 26/e p893, 25/e p918)
- "90% all abdominal aortic aneurysms are related to atherosclerotic disease and most of these aneurysms are below the level of renal arteries."

ANEURYSM

- **Aneurysm**: permanent and irreversible localized dilatation of blood vessel with at least **50% increase** in diameter
- **Ectasia**: dilatation <50% of normal diameter
- **AAA** (abdominal aortic aneurysm) is diagnosed if diameter >3 cm in males or >2.6 cm in females

- MC location: Aorta >Iliac >Popliteal >Femoral (AIPF)^Q
- MC site of extra-cranial arterial aneurysm is **infrarenal aorta**^Q
- MC site of peripheral aneurysm: **Popliteal aneurysm**^Q
- Degenerative aneurysms (caused by atherosclerosis) are MC AAA (90%)^Q

- **Width of aneurysm is most important predicting factor of rupture**^Q.
- **Juan Parodi**^Q introduced endovascular aortic aneurysm repair (EVAR).

Classification

- **True** (all three layers of vessel are involved), **false** (do not have all three layers of vessel)
- **Infected (mycotic) aneurysm** are false aneurysm
- **Dissecting aneurysm** (dissection with aneurysmal dilatation of false lumen)
- **Fusiform** (symmetrical enlargement involving whole circumference of artery)
- **Saccular** (affect only part of the arterial circumference) have **higher risk of rupture**^Q

100. Ans. a. Surgery indicated when size AAA > 6 cm (Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1697-1710; Schwartz 10/e p850-859, 9/e p723-730; Bailey 26/e p893-898, 25/e p918-923)

- Surgery indicated when size of AAA >5.5 cm^Q (Not the 6 cm).
- After rupture, **mortality rate of emergent operation is 45-50%**^Q.
- **Most serious gastrointestinal complication is ischemia of the left colon and rectum**. Post-operative hypotension and hemodynamic instability are contributory factors^Q.
- Occasionally, **microembolization** can occur, resulting in **small patchy areas of ischemia**, usually on the **plantar aspect of the foot**, referred to as **trash foot**^Q.

ABDOMINAL AORTIC ANEURYSM

- MC site of aortic aneurysm is **infrarenal aorta**^Q
- Risk Factors: Age, male gender, white race, smoking and family history^Q

- **Inverse relationship** between **diabetes mellitus** and development of AAA^Q
- Prevalence of AAA is **higher in men** with **inguinal hernia** and **COPD**^Q

Clinical Presentation

- Natural history of AAAs is **continuous expansion**^Q

- **Rupture is MC and most lethal complication**^Q
- **Most rupture occurs in retroperitoneal space**, others in abdominal cavity, IVC, iliac vein or duodenum (**4th part-MC**)
- **AAA rupture most commonly in left retroperitoneum**^Q

- **Growth rate of AAAs vary with aneurysm size**, more rapid growth seen in aneurysms 5 cm or larger
- **MC symptom: Chronic vague abdominal or back pain**^Q

- **Triad of aortic rupture: sudden onset midabdominal or flank pain + shock + pulsatile abdominal mass**; present in **one third** cases only^Q
- **Acutely expanding AAA** produce **severe deep back pain** or **abdominal pain radiating to back**, associated with **tenderness** to palpation of aneurysm (this presentation signifies **impending rupture** and **urgent evaluation and treatment is required**)^Q

- In **aortocaval** or **aortoiliac fistula**: Unilateral or bilateral lower extremity edema, high output CHF and continuous abdominal bruit or palpable thrill is present
- CCBs such as **diltiazem** and **nifedipine** are the **drugs of choice**^Q.
- **Gross hematuria** from **intravesicular venous hypertension** is one of **characteristic sign** of **aortocaval fistula**
- AAA may **rupture into GIT**, MC site is **4th part of duodenum**^Q, producing primary aortoenteric fistula, shock and massive GI bleeding.

- Occasionally, **microembolization** can occur, resulting in **small patchy areas of ischemia**, usually on the **plantar aspect of the foot**, referred to as **trash foot**^Q.

101. Ans. a. Laterally into the left retroperitoneum

102. Ans. d. Myocardial infarction (Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1699-1710; Schwartz 10/e p850-859, 9/e p725-730; Bailey 26/e p894-898, 25/e p918-923)

- MC complication of descending aortic aneurysm surgery is **non-fatal MI** > Renal failure.

MANAGEMENT OF ABDOMINAL AORTIC ANEURYSM

Diagnosis

- Plain X-ray detects AAA in upto 70% cases by characteristic **"eggshell" pattern of calcification**
- **Negative abdominal radiograph doesn't exclude** the diagnosis.

- CT is IOC for diagnosis and planning repair in AAA^Q
- MRI is IOC for diagnosis and with MR angiography planning repair in AAA with renal insufficiency^Q

- Advantage of **Percutaneous arteriography** over CT or MRI is its **ability to measure pressure gradient** across occlusive lesions if present, and **potentially to direct treatment**

Screening for Abdominal Aortic Aneurysm

- AAAs remain **asymptomatic for several years**, death from **rupture** occurs in **one third of untreated cases**
- **Ultrasound is preferred method of screening**^Q

Pre-operative Evaluation

- Patients with major clinical predictors of **cardiac risk** are considered for **pre-operative angiography**

- Patients with **high grade (70-99%) internal carotid stenosis** are considered for **carotid endarterectomy** before AAA repair^Q

- **Prompt operative intervention** is indicated in cases of **rupture**^Q

Medical Management

- NSAIDs and tetracycline may have potential to reduce aneurysmal growth by inhibiting MMP.

Indications of repair of AAA

- | | |
|---|---|
| <ul style="list-style-type: none"> • Diameter 5.5 cm or more in men^Q • Symptomatic aneurysm^Q • For women and patients with greater than average rupture risk, AAA diameter 4.5 to 5.0 cm | <ul style="list-style-type: none"> • Rate of expansion >1 cm/year^Q • Atypical aneurysms^Q (dissecting, pseudoaneurysm, mycotic, saccular and penetrating ulcer) regardless of size |
|---|---|

Treatment

- Open repair: Transperitoneal and Retroperitoneal approach

Indications for Retroperitoneal Approach	
<ul style="list-style-type: none"> • History of multiple prior operations^Q • Hostile abdomen^Q • Radiation treatment^Q • Suprarenal aneurysm extension^Q 	<ul style="list-style-type: none"> • Horse-shoe kidney^Q • Peritoneal dialysis • Inflammatory aneurysm or ascites^Q

- Advantage: Reduced GI and pulmonary complications, reduced length of ICU and hospital stay^Q
- Disadvantage: Poor accessibility to distal right arteries and right renal artery

Results of Open Repair

- Mortality rate of elective open infrarenal AAA repair is <5% in good risk patients

- MC cause of death is myocardial dysfunction, usually ischemic in origin^Q
- Complications occur in 10-30% cases
- MC complication is non-fatal MI followed by renal failure^Q
- Renal failure after repair of ruptured AAA carries a high mortality rate

- Most serious gastrointestinal complication is ischemia of the left colon and rectum^Q
- Post-operative hypotension and hemodynamic instability are contributory factors

- First indication of bowel ischemia may be **substantial IV fluid requirement**^Q in the first 8-12 hours after the operation.
- **Diarrhea**, usually **blood** typically follows **within 48 hours**^Q
- If necrosis is limited to mucosa: **Conservative treatment** with bowel rest, antibiotics and fluid resuscitation
- In full thickness necrosis or peritoneal irritation: **Urgent reoperation** with resection of ischemic bowel and **creation of stoma**
- **Mortality rate: 50%**^Q (higher when full thickness bowel necrosis and peritonitis occur)

103. Ans. b. 5.5 cm

104. Ans. b. Emergency surgery complication <10%, c. Rarely asymptomatic before rupture

105. Ans. d. Both intravascular and extra-vascular infection (Ref: Harrison 18/e p2061, 2065; Sabiston 19/e p1884)

- A mycotic aneurysm is an infected aneurysm resulting from either an extravascular or an intravascular source of infection.

MYCOTIC ANEURYSM

- Mycotic aneurysms are focal dilatation of arteries occurring at points in the arterial wall weakened by infection

Mycotic aneurysms may originate	
1.	As a result of embolization from bacterial endocarditis ^Q
2.	As an extension of an adjacent suppurative process ^Q (extravascular source), ex. Osteomyelitis, sinus infection, meningitis etc.
3.	By circulating organisms directly infecting arterial wall ^Q

- MC location: Femoral artery >Aorta^Q
- MC organisms: Staphylococcus >Salmonella^Q

106. Ans. b. Computed tomography

107. Ans. d. Most common side effect is diarrhea and hypotension

108. Ans. b. Atherosclerosis

109. Ans. c. Splenic artery (Ref: Sabiston 19/e p1761-1763; Schwartz 10/e p1425, 9/e p1256; Bailey 25/e p1103-1104) and (Ref: Shackelford 7/e p1098-1100)

- MC site of intra-abdominal aneurysm: Aorta >Splenic artery^Q
- MC site of splanchnic artery aneurysm: Splenic artery^Q

110. Ans. c. Discontinuation of arteria radicularis magna

Arteria Radicularis Magna

- Arteria radicularis magna (**artery of Adamkiewicz**) is the **main source of blood supply** to the **anterior spinal artery** in the **thoracolumbar segment** of the **spinal cord**^Q.
- It arises from either one of the lower posterior intercostal arteries (**T9-T11**) or of the subcostal artery (**T12**), or less frequently of the upper lumbar arteries (**L1 and L2**)^Q.
- **Occlusion or interruption** is one of the major reasons for **spinal cord ischemia** (leading to **paraparesis /paraplegia**) during **surgery for thoracoabdominal aneurysms**^Q.

111. Ans. a. Saccular aneurism involves whole circumference

112. Ans. b. MRI

FEMORAL ARTERY ANEURYSM

113. Ans. a. Ultrasound guided compression of the neck of aneurysm, b. Thrombin injection, c. Bypass graft repair (Ref: Sabiston 19/e p1755; Bailey 26/e p899, 25/e p923)

FEMORAL ARTERY ANEURYSM

- Bilateral in >50% cases and 92% have a concomitant aortoiliac aneurysm^Q
- True FAA are almost always degenerative atherosclerotic aneurysms^Q

Etiology

- True FAA are almost always degenerative atherosclerotic aneurysms
- False FAA may develop as a result of disruption of graft-artery anastomosis following surgical revascularization with aortofemoral or femoropopliteal bypass
- MC organisms causing mycotic aneurysms are *Staphylococcus aureus*, *E. coli*, *Salmonella*^Q.

Diagnosis

- Diagnosis of atherosclerotic FAA is usually made by physical examination and confirmed by USG^Q.

Treatment

- In patients who present with femoral pseudoaneurysms after catheterization, USG-guided compression with or without thrombin injection^Q, can also be used to treat the disease

- All true FAA >2 cm should be repaired because of risk of thrombo-embolic complications or increased risk of rupture^Q
- High risk of rupture in cases of large, false or aneurysm involving profunda femoris^Q

- Treatment involves resection and replacement with prosthetic interposition graft with attempt of revascularization of profunda femoris.

Results of Open Repair

- Asymptomatic patients do well but amputation rate of 10% in symptomatic patients.

- Highest amputation rates in drug addicts requiring treatment of infected FAA^Q.
- Autologous repair with a vein graft and immediate coverage with sartorius muscle flap decreases rate of reinfection and recurrent bleeding^Q.

114. Ans. a. Radial, b. Brachial, c. Femoral (Ref: Rutherford Vascular Surgery 6/e pvol I/456)

- "IV drug abusers can lead to number of specific vascular complications including septic thrombophlebitis, Aortic dissection, AV fistula and necrotizing fasciitis with gangrene of extremity. The most frequent vascular complication in drug addicts is infected pseudoaneurysm of the femoral^Q, brachial^Q or radial artery^Q."

115. Ans. a. Radial artery, b. Brachial artery, c. Femoral artery

POPLITEAL ARTERY ANEURYSM

116. Ans. c. Popliteal artery (Ref: Sabiston 19/e p1755; Bailey 26/e p899, 25/e p923)

POPLITEAL ARTERY ANEURYSM

- MC peripheral aneurysm and account for 70% cases^Q
- Most patients are male with bilateral disease in 53% cases
- Amputation rate in acute thromboembolism is upto 30%

Indications for treatment

- | | |
|---|--|
| <ul style="list-style-type: none"> • Symptomatic patients^Q • Aneurysm >2 cm^Q | <ul style="list-style-type: none"> • Thrombus in aneurysm^Q • Angiographic evidence of distal embolization^Q |
|---|--|

Diagnosis

- Diagnosed by physical examination and duplex scan^Q

117. Ans. a. Popliteal

118. Ans. d. Uncommon among peripheral aneurysm

ILIAC ARTERY ANEURYSM

- Occur in conjunction with aortic aneurysm in 40% cases
- Most isolated iliac aneurysm involve common iliac artery (70%) and internal iliac artery (20%)
- Multiple iliac aneurysms occur in most patients and are bilateral in 33% cases

Etiology

- Occur in association with atherosclerosis
- Can also occur in pregnancy in absence of atherosclerosis as well as in Marfan and Ehlers-Danlos syndromes, Kawasaki disease, Takayasu's arteritis, cystic medial necrosis and arterial dissection

Clinical Features

- More common in males, right and left sides are equally involved^Q
- Symptoms are caused by compression of adjacent pelvic structures^Q (bladder, colon, ureter, rectum, lumbosacral nerves and pelvic vein)
- Most common iliac aneurysms can be palpated on abdominal exam whereas internal iliac artery aneurysm are more readily palpated on rectal examination^Q

Treatment

- Operative mortality rate in patients with ruptured iliac aneurysm is 40%.
- Iliac aneurysms >3.5^Q cm are repaired if possible.

Minimum Size for Surgery (AIPF: All India Police Force)

Abdominal Aortic Aneurysm (5.5 cm) = Iliac aneurysm (3.5 cm) + Popliteal/Femoral aneurysm (2.0 cm)

PSEUDOANEURYSM119. Ans. b. Trauma (<http://en.wikipedia.org/wiki/Pseudoaneurysm>)

- MC cause of pseudoaneurysm: Trauma (Penetrating trauma or iatrogenic by catheterization)^Q

120. Ans. a. Radial artery, b. Brachial artery, c. Femoral artery

121. Ans. a. Ligation of involved vessel and wide surgical debridement (Ref: Rutherford Vascular Surgery 6/e pool II/248-249, 813, 1055-1056)

TREATMENT OF PSEUDOANEURYSM

- USG guided compression is the first therapeutic maneuver^Q in non-invasive vascular technology. Although it is safe but efficacy is modest and the procedure is uncomfortable for patient and provider.
- Injection of thrombin into the pseudoaneurysm under duplex ultrasound guidance has not replaced compression as treatment for pseudoaneurysm. This technique is safe and effective^Q. It reduces physical effort and time requirements for the technologist and is significantly less uncomfortable for the patient.
- As spontaneous resolution of pseudoaneurysm has a low incidence, surgical repair is the main therapy and gold standard therapy^Q.

Indications of Surgery	
Absolute	Relative
<ul style="list-style-type: none"> • Failure of other treatment modalities^Q • Suspected secondary infection^Q • Evidence of vascular compromise^Q • Ongoing or imminent hemorrhage^Q • Skin erosion and necrosis due to false aneurysm expansion^Q 	<ul style="list-style-type: none"> • Femoral neuropathy • Continuous anticoagulation • Concomitant AV fistula

Surgical Intervention

- Operative repair can involve simple stitch or replacement of the entire vessel with graft^Q.
- Mainstays of surgical treatment: Proximal control (above inguinal ligament if needed, for extensive groin pseudoaneurysm), use of monofilament suture for vascular repair and debridement of devitalized tissue^Q.
- In the presence of any infection or when large residual tissue defect persists, muscle coverage with either sartorius or rectus abdominis flap over the repaired vessel must be used^Q.

Treatment of Pseudoaneurysm in IV Drug Abusers

- **Ligation** is optional treatment for **infected pseudoaneurysm** because it is **easy, safe** and **cost effective** (in IV drug abuser there is **high chance of infection**)^Q
- **Reconstruction is not recommended** because of **extension of infection** at location of pseudoaneurysm and **at artificial graft site**^Q.

SUBCLAVIAN STEAL SYNDROME

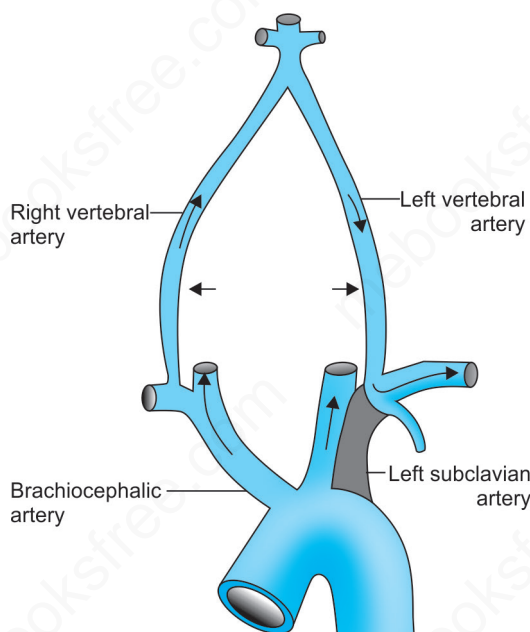
122. Ans. a. First part (Ref: *Grainger Diagnostic Radiology 4/e p 773; Bailey 26/e p886, 25/e p908-909*)

MC site of subclavian artery stenosis is the **first part** of the subclavian artery.

SUBCLAVIAN ARTERY STENOSIS

- MC cause of subclavian artery stenosis: **Atherosclerotic disease**
- Left^Q subclavian artery stenosis is significantly more common than right
 - MC site of stenosis: **First part**^Q of the subclavian artery
 - Stenosis typically occurs just distal to the origin of the subclavian artery and lies proximal to the origin of the vertebral artery^Q.
- Stenosis of the **first part** of the subclavian artery may give rise to the **subclavian steal syndrome**^Q
- **Subclavian steal syndrome** is characterized by **reversed flow in the vertebral artery** to compensate for a proximal stenosis in the ipsilateral subclavian artery there by **stealing blood from the 'brain'** to feed the 'arm'^Q.

123. a. Reversal of blood flow in the ipsilateral vertebral artery (Ref: *Bailey 26/e p886, 25/e p908-909*)



SUBCLAVIAN STEAL SYNDROME

- Occlusion of either the **innominate (brachiocephalic)** or the **subclavian artery** before the origin of the vertebral artery reverses the **direction of blood flow** in the **ipsilateral vertebral artery**^Q.
 - This **reversal of flow** often is **asymptomatic** but may cause **ischemia in the posterior circulation**^Q.
 - **Neurological features** are **weakness, vertigo, visual complaints, and syncope**^Q.
 - Classically **symptoms occur** when **arm exercise increase the steal of blood flow from the brainstem**^Q.
- The **exercise reduces peripheral resistance** in the affected arm, **lowering blood pressure distal to occlusion**. This in turn results in **increased retrograde flow from the vertebral artery**^Q.
- If the **contralateral vertebral artery** cannot keep up with the demand, the **arm may steal blood from the basilar artery**, lowering the pressure in the **posterior cerebral circulation**^Q.
- The result may be **transient vertebrobasilar ischemia**^Q.

VASCULAR GRAFT

124. Ans. a. Autologous vein

125. Ans. a. Saphenous vein graft (upside-down) (Ref: Bailey 25/e p905; Washington Manual of surgery 5/e p322)

- Saphenous vein is the most suitable conduit for bypass, below the inguinal ligament. It may be used either as a reversed conduit or as an 'in situ' vein bypass conduit after valve destruction.

INFRA-INGUINAL OCCLUSIVE DISEASE (FEMORAL, POPLITEAL, TIBIAL OCCLUSIVE DISEASE)

- Autologous vein is the conduit of choice for infra-inguinal bypass surgery^Q
- Great saphenous vein is the vein of choice (Lesser saphenous vein or arm veins may be used)^Q
- These grafts may be used either 'in situ' after valve destruction or reversed conduit

When Autologous vein grafts are not available PTFE grafts may be used.

For above knee grafts, patency rates of PTFE grafts approach those achieved by autologous venous grafts^Q

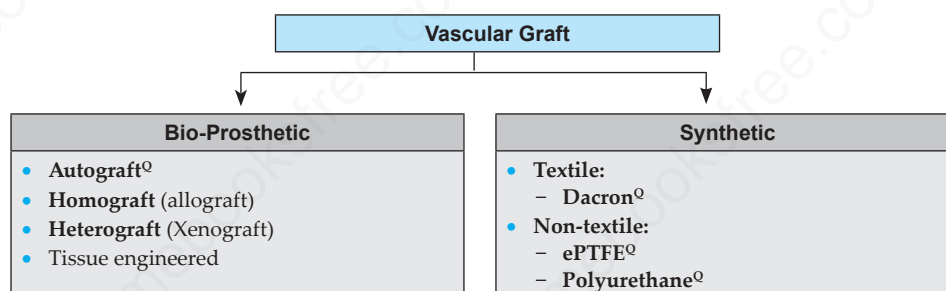
- For below knee / distal grafts, patency rates of PTFE grafts are substantially lower^Q.

126. Ans. c. Smooth muscle cells (Ref: Vascular.surgery.duke.edu/files/.../Vascular_Grafts_2-27-09.pdf; Schwartz 9/e p762-764)

Vascular Graft Failure

- Smooth muscle cells in the middle layer (media) of the vessel wall become activated, divide, proliferate and migrate into the inner layer (intima)^Q.
- The resulting abnormal neointimal cells express pro-inflammatory molecules, including cytokines, chemokines, and adhesion molecules that further trigger a cascade of events that lead to occlusive neointimal hyperplasia and eventually graft failure^Q.

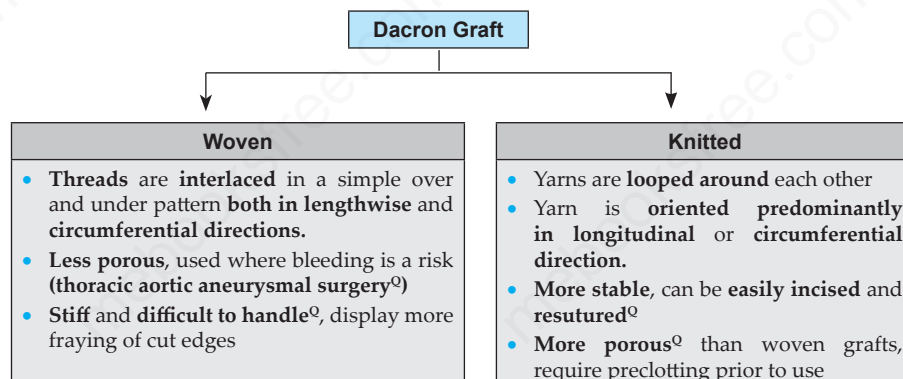
127. Ans. b. Textile synthetic (Ref: Sabiston 19/e p1791; Schwartz 10/e p4, 9/e p762; Bailey 25/e p905-907)



128. Ans. c. Saphenous vein

129. Ans. a. Dacron (Ref: www.ncbi.nlm.nih.gov/pubmed/16222385; Schwartz 10/e p4, 9/e p762)

- Dacron is the favoured material for aortoiliac work, it gives excellent results.



130. Ans. d. Can be easily incised and the opening resutured

131. Ans. d. PVC

132. Ans. c. Autologous vein

VASCULAR TRAUMA

133. Ans. c. The pulse is weakened, d. There is no pulse

134. Ans. a. Most commonly associated with deceleration injury, b. High mortality, c. Surgery definitive treatment, d. Aortography gold standard (Ref: Sabiston 19/e p1793-1794; Schwartz 10/e p214-215, 9/e p151, 172-173; Bailey 25/e p343; CSDT 11/e p257-259)

TRAUMATIC AORTIC RUPTURE

- Traumatic aortic rupture is a **cause of sudden death** after an **automobile collision** or **fall from a great height**^Q.
- Vessel is **relatively fixed distal to the ligamentum arteriosum**, just distal to the origin of the left subclavian artery^Q.
- **Causes:** Trauma to the chest, **Rapid deceleration injury**^Q

Clinical Presentation

- **Traumatic aortic rupture is lethal in 75-90%** of patients^Q and only **15-20% arrive** at the hospital alive^Q.
- Approx. **90%** of those **who arrive alive** at the hospital have an **injury in the region of the aortic isthmus** > Injuries to the ascending aorta^Q.
- Usually associated with other injuries like solid organ.

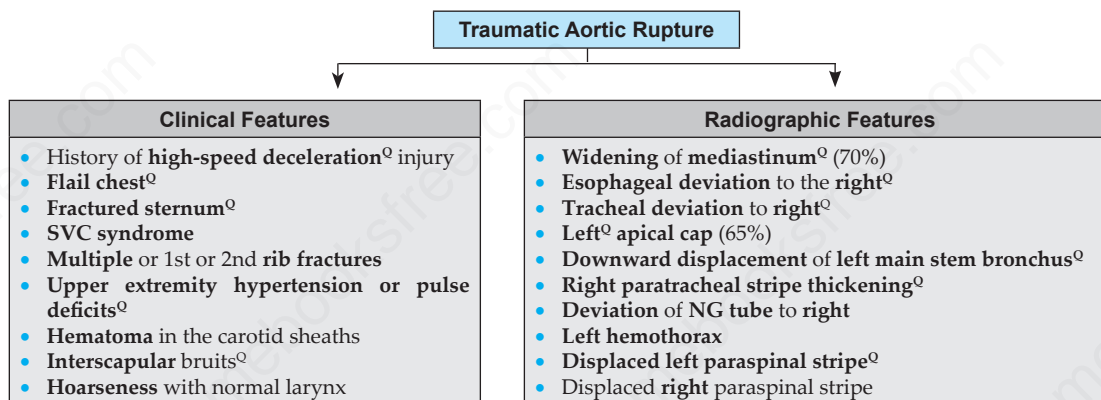
Diagnosis

- **X-ray chest:** Widened mediastinum^Q
- **Aortography:** Gold standard for diagnosis^Q
- **Contrast enhanced CT, Trans-esophageal Echocardiography (TEE)** are useful in making diagnosis.

Treatment

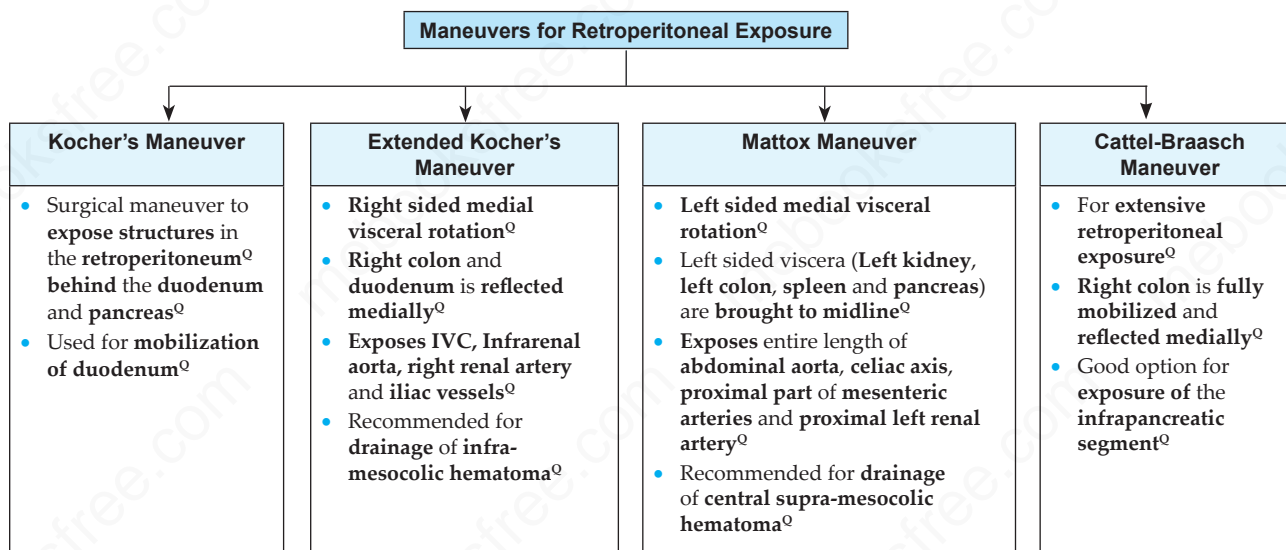
- Control of systolic BP to less than 100 mm Hg
- Endovascular intra-aortic stenting^Q
- **Direct repair or excision and grafting using a Dacron graft**^Q.

135. Ans. a. Mediastinal widening, b. Abnormal aortic contour, d. Right paratracheal stripe thickening, e. Left apical pleural cap (Ref: Chapman 4/e p163-164; CSDT 11/e p257-259)



136. Ans. b. Left medial visceral rotation (Ref: Sabiston 19/e p1796-1797)

- Left medial visceral rotation exposes entire length of abdominal aorta, celiac axis, proximal part of mesenteric arteries and proximal left renal artery^Q.



ANGIOGRAPHY AND COMPLICATIONS

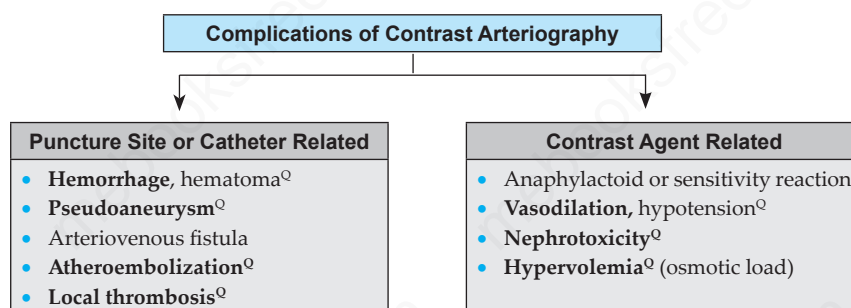
137. Ans. b. Arteriography (Ref: Sabiston 19/e p1733; Schwartz 10/e p832-833, 918, 9/e p751; Bailey 26/e p190, 25/e p903)

- Seldinger needle is used for angiography (arteriography).

ARTERIOGRAPHY

- Aortic and lower extremity arteriograms are generally performed by needle puncture of the femoral^Q or brachial arteries^Q followed by guidewire placement and catheter insertion using the Seldinger technique.

138. Ans. d. Intracerebral hemorrhage (Ref: Sabiston 19/e p1733; Schwartz 9/e p751; Bailey 26/e p190, 25/e p903)



139. Ans. a. Radial artery (Ref: Lee Anesthesia 12/e p25)

- Arterial puncture and cannulation is performed to measure PaO₂, PaCO₂, SpO₂ and pH to clarify the acid-base and electrolyte status.
- Any artery that can be compressed after puncture may be used (but **not end arteries**), usually the radial^Q (**preferred**), brachial or femoral.

140. Ans. b. Single wall puncture is indicated in those with normal coagulation profile (Ref: Mastery of Surgery 5/e p218)

- Single wall puncture is indicated in those with coagulopathy as there is more risk of bleeding in double wall puncture technique.

ABDOMINAL AORTIC ANEURYSM

- Arterial access is obtained for hemodynamic monitoring and angiography and interventions.
- Femoral artery is most frequently cannulated artery in the body^Q.

- Femoral artery is a large caliber vessel appropriate for angioplasty and stenting of peripheral vessels^Q.
 - Radial artery is most frequently used site of arterial cannulation for hemodynamic monitoring^Q.
- Femoral artery is identified in the inguinal region by its pulsation.
- If fluoroscopy is being used, the femoral artery is typically located over the medial third of the femoral head^Q.
- Femoral artery cannulation can be done using Seldinger technique.

- The Seldinger technique is a medical procedure to obtain safe access to blood vessels (both arteries and veins) and other hollow organs^Q.
- Single wall puncture is indicated in those with coagulopathy or if thrombolysis is planned because of increased risk of bleeding in double wall technique^Q.

TARAYASU ARTERITIS

141. Ans. a. Aortoarteritis (Ref: Harrison 18/e p2796; Sabiston 19/e p1753; Schwartz 10/e p788, 901, 9/e p668, 767; Bailey 26/e p900, 25/e p924)

TAKAYASU'S ARTERITIS (AORTOARTERITIS OR PULSELESS DISEASE)

- Rare but well-recognized chronic inflammatory arteritis affecting large vessels, predominantly the aorta and its main branches^Q.
- Chronic vessel inflammation leads to wall thickening, fibrosis, stenosis, and thrombus formation^Q.
- Symptoms are related to end-organ ischemia.

- Pathologic changes produce stenosis, dilation, aneurysm formation and occlusion^Q.

Clinical Features

- Occurs predominantly in adolescent girls and young women^Q, age of 10-40 years^Q
- More common in Asia^Q

- Subclavian artery is MC involved vessel leading to loss or weakening of pulses (Pulseless Disease)^Q.

- Characteristic clinical features: **Hypertension** reflecting renal artery stenosis, **retinopathy**, **cerebrovascular symptoms**, angina and congestive heart failure, abdominal pain or GI bleeding or **extremity claudication**.

Diagnosis

- Laboratory data: **Raised ESR, CRP and WBC count^Q**
- **Angiography: Gold standard for diagnosis^Q**

Treatment

- **Steroid therapy** initially, with **cytotoxic agents** in patients who do not achieve remission^Q.
- **Surgical treatment** is performed **only in advanced stages**, and bypass needs to be delayed during active phases of inflammation.

142. b. Subclaviary artery

MISCELLANEOUS

143. Ans. c. Integrity of palmar arch

144. Ans. b. Superficial temporal http://en.wikipedia.org/wiki/Cirroid_aneurysm

CIRROID ANEURYSM

- A cirroid aneurysm is the **dilation of a group of blood vessels** due to **congenital malformations** with AV (arteriovenous) shunting^Q.
- **Cirroid** means resembling a varix.
- **Most commonly occurs over the head** usually the **superficial temporal artery**.
- **Superficial temporal artery** is the **most commonly involved artery^Q**.

145. Ans. c. Palpable pulses (Ref: [www.ncbi.nlm.nih.gov/BrMedJ/v.1\(3927\); Apr 11, 1936](http://www.ncbi.nlm.nih.gov/BrMedJ/v.1(3927);Apr11,1936))

ERYTHROCYANOSIS

- A condition caused by **exposure to cold^Q**
- Characterized by **swelling of the limbs** and the appearance of **irregular red-blue patches** on the skin^Q
- Occurring especially in **girls and women^Q**

146. Ans. a. Aneurysm Endovascular Hunterian Ligation/ - (Ref: *Youmans Neurological Surgery*)

HUNTERIAN LIGATION

- **Hunterian ligation** refers to one of the **oldest successful interventions** for arterial aneurysms: **Ligation of the femoral artery to treat a popliteal aneurysm^Q** by John Hunter in 1785.

147. Ans. c. It is not superficial and does not cross prominent bone

- The **popliteal pulse** is **difficult to feel** because it is **not superficial** and **does not cross a prominent bone^Q**.

148. Ans. c. Myocardial infarction (Ref: *CSDT 11/e p822; Miller's Anesthesia 6/e p2053*)

- Miller says "**Myocardial performance** is the **single most important determinant** of outcome following a major vascular operation^Q."
- **Non-fatal** and **fatal MIs** are the **most important** and **specific outcomes** that **determine perioperative cardiac morbidity** in patients for vascular surgery^Q.
- CSDT says "**MI and stroke** are **most common causes of death** in vascular surgeries^Q."

149. Ans. d. Bifurcation of pulmonary artery (Ref: *Harrison 18/e p2171*)

SADDLE THROMBUS

- A large thrombus lodged at an arterial bifurcation, where blood flows from a large-bore vessel to a smaller one.
- The 'classic' saddle embolus, which occurs at the bifurcation of the pulmonary arteries in fatal pulmonary embolism secondary to a centrally migrating venous embolus, is distinctly uncommon^Q

150. Ans. b. Palmar arch insufficiency 151. Ans. c. Salmonella

152. Ans. d. All of the above (Ref: Harrison 18/e p2037; Schwartz 9/e p763-764)

STENT THROMBOSIS

- Clotting suppressant agents and anti-clotting agents should be continued after drug eluting stents to prevent stent thrombosis^Q.
 - Endothelialization is a hallmark of vascular healing and is important for the prevention of thrombus formation^Q.
 - For drug-eluting stents (which, by design, delay formation of a new endothelium cover over the stent), the incidence of clot formation within the stent may persist for a longer period of time^Q.
- Drug eluting stents have been associated with delayed arterial healing and the prevalence of latent thrombus after five years, suggesting that patients may continue to be risk for stent thrombosis for an extended period of time.
- Treatment with the antiplatelet drugs appears to be the most important factor reducing this risk of thrombosis, and early cessation of these drugs after drug-eluting stenting markedly increases the risk of stent thrombosis and myocardial infarction^Q.

153. Ans. d. Accidental injury to major vessels in thigh or groin (Ref: Bailey 18/e p69, 147)

BUTCHER'S THIGH

- Butcher's thigh is penetrating wound of femoral triangle due to knife slipping while boning meat.
- Penetrating wound involving main veins in the thigh or groin are potentially fatal, as exsanguination may follow the first aid dressing which has apparently controlled the bleeding.

154. Ans. a. Direct pressure (Ref: Advanced Assessment and Treatment of Trauma by Americans (2010)/71)

EXTERNAL BLEEDING

- Control of external hemorrhage during the early phase (circulation) of resuscitation is imperative.
- External bleeding is best controlled by direct digital pressure.
- Direct pressure assists in the process of coagulation by slowing the flow of blood out of the vessels and giving clot time to form.
- In most cases of external bleeding, if pressure is applied quickly to the area of hemorrhage (direct pressure) or to the blood vessel supplying the bleed (indirect pressure), the volume of blood escaping will be greatly reduced.
- To be effective, direct pressure must be at least equal to the pressure of the blood attempting to escape.
- Arterial bleeding is often difficult to control and may require upto 5 minutes of firm direct pressure to be successful.

155. Ans. a. Giant cell arteritis (Ref: Harrison 18/e p2795; Robbins 8/e p512, 513)

Temporal arteritis is also known as Giant cell arteritis.

GIANT CELL ARTERITIS (TEMPORAL ARTERITIS)

- Predominantly afflicts patients older than 50 years of age^Q, with a slight (2 : 1) female preponderance.
- The incidence increases for each decade over age 50 years.
- The superficial temporal^Q, vertebral, and major aortic arch branches may be involved.

Clinical Features

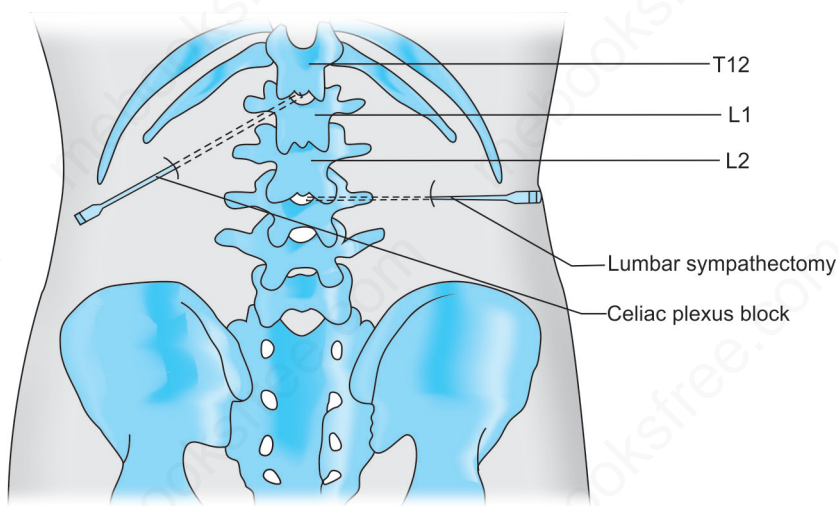
- Ischemic symptoms are common, including claudication of facial or extremity muscles and retinal ischemia^Q.
- Headache is a common symptom.
- Blindness, usually irreversible, is a dreaded complication^Q.

Treatment

- When the clinical diagnosis is suspected, treatment must be prompt and consists of high-dose corticosteroid therapy^Q.
- Surgery is rarely indicated except in cases of major aortic branch involvement with ischemic symptoms.

156. Ans. d. Most common side effect is diarrhea and hypotension

(Ref: Anesthesiology Keyword Review by Raj K. Modak 2013/page 130; <http://www.ncbi.nlm.nih.gov/pubmed/7818115>)



CELIAC PLEXUS BLOCK

- **Celiac plexus** also known as the **solar plexus** is located behind the stomach and omental bursa, and in front of the crura of the diaphragm
- **Location is at the level of the first lumbar vertebra.**
- Formed (in part) by the **greater and lesser splanchnic nerves** of both sides, and also parts of the **right vagus nerve.**
- **Supplies upper GI organs, lower esophagus, liver and pancreas**
- **Done usually bilaterally using alcohol or phenol**

Indications:

- **Intractable pain** from cancers (**pancreatic cancer**)
- **Intractable pain** related to **chronic pancreatitis**

Side-Effects:

- Most common side effects include **hypotension** and **diarrhea**.
 - **Hypotension:** Because of the sympathetic blockade of splanchnic vasculature
 - **Diarrhea:** Unopposed parasympathetic activity following **celiac plexus block**

Venous Disorders

MULTIPLE CHOICE QUESTIONS

HYPERCOAGULABLE STATES AND DVT RISK FACTORS

- All the following disorders are inherited except: (JIPMER 2010)
 - Protein S deficiency
 - Antiphospholipid antibody syndrome
 - Protein C deficiency
 - Factor V Leiden mutation
- Congenital cause of hypercoagulable states are all except: (AIIMS Nov 2010)
 - Protein C deficiency
 - Protein S deficiency
 - MTHFR mutation
 - Lupus anticoagulant
- All of the following are acquired causes of hypercoagulability, except: (All India 2009)
 - Infection
 - Inflammatory bowel disease
 - Myeloproliferative disorders
 - Prolonged surgery
- A patient is admitted with 3rd episode of deep venous thrombosis. There is no history of any associated medial illness. All of the following investigations are required for establishing the diagnosis except: (AIIMS Nov 2004)
 - Protein C deficiency
 - Antithrombin II deficiency
 - Antibodies to factor VIII
 - Antibodies to cardiolipin
- The deficiency of all the following factors increases the incidence of thrombus formation except: (DPG 2010)
 - Lipoprotein A
 - Protein-C
 - Anti-thrombin III
 - Protein-S
- All are risk factors for venous thrombosis except: (Punjab 2009)
 - Estrogen
 - Sickle cell anemia
 - PNH
 - Prolonged immobilization
- All are hypercoagulable states, except: (AIIMS June 98)
 - Protein C resistance
 - Factor V Leiden deficiency
 - Antiphospholipid antibody
 - Polycythemia
- All of the following conditions predispose to thrombosis except: (AIIMS Dec 98)
 - Paroxysmal nocturnal hemoglobinuria
 - Homocystinuria
 - Hypomagnesemia
 - Behcet's syndrome
- Coagulation defects associated with increased coagulation are seen in: (PGI Dec 2006)
 - Increased Protein C
 - Increased Protein B
 - Increased Anti-thrombin III
 - Dysfibrinogenemia
- Hypercoagulability due to defective factor V gene is called: (AIIMS Nov 2003)
 - Lisbon mutation
 - Leiden mutation
 - Antiphospholipid syndrome
 - Inducible thrombocytopenia syndrome
- Most common inherited thrombotic disorder is: (PGI Dec 2005)
 - Protein C deficiency
 - Protein S deficiency
 - Factor V Leiden mutation
 - Prothrombin gene mutation
 - t-PA deficiency
- Which of these is not a risk factor for thromboembolism? (AIIMS Nov 2001)
 - Myocardial infarction
 - Hypertension
 - Estrogen therapy
 - Superficial thrombophlebitis
- Which one does not cause deep vein thrombosis? (AIIMS Nov 95)
 - Estrogen
 - Thrombocytosis
 - Paroxysmal nocturnal haemoglobinuria
 - Sickle cell anemia
- Post operative pulmonary thromboembolism is seen in all, except: (All India 2000)
 - Tall and thin man
 - Obese male
 - Pregnant female
 - Estrogen therapy
- All of the following conditions may predispose to pulmonary embolism except: (All India 2003)
 - Tall and thin man
 - Malignancy
 - Obesity
 - Progesterone therapy
- Risk factors of pulmonary embolism: (PGI Dec 2005)
 - 30 years female on OCP's
 - Pregnancy
 - Leg paralysis
 - 50 years person with uncomplicated cholecystectomy
 - Behcet's disease

DEEP VENOUS THROMBOSIS

- Which of the following is associated with Virchow's triad? (MCI Sept 2005)
 - Hypercoagulability
 - Disseminated malignancy
 - DVT
 - All of the above

18. **DVT prophylaxis is indicated in all except:** (PGI May 2011)
 - a. Abdominal surgery for malignant disease and high risk patient
 - b. All patients with age more than 40 years
 - c. Patient undergoing major orthopedics surgery
 - d. Systemic heparin is only method for DVT prophylaxis
 - e. 10% of patients of calf vein thrombosis progress to pulmonary embolism
19. **Thromboembolism after pelvic surgery is usually from the veins:** (All India 89)
 - a. Iliac
 - b. Calf
 - c. Femoral
 - d. Pelvic
20. **In DVT all are seen except:** (CMC 2001)
 - a. High fever
 - b. Increased temperature at site
 - c. Pain
 - d. Tenderenss
21. **Virchow's triad includes all of the following, except:** (AIIMS June 2004)
 - a. Venous stasis
 - b. Injury to veins
 - c. Blood hypercoagulability
 - d. Venous thrombosis
22. **Deep vein thrombosis is seen in all except one:** (AIIMS Feb 97)
 - a. Prolonged immobilization
 - b. Subungual melanoma
 - c. Pregnancy
 - d. Major surgical operation
23. **Deep vein thrombosis occurs most commonly after:** (AIIMS Feb 97)
 - a. Total hip replacement
 - b. Gastrectomy
 - c. Prostatic operation
 - d. Brain surgery
24. **Commonest cause of pulmonary embolism is:** (All India 99)
 - a. Thrombosis of leg veins
 - b. Thrombosis of prostatic veins
 - c. IVC thrombosis
 - d. Thrombosis of internal pudendal artery
25. **DVT, investigation of choice is:** (DNB 2005, 2001, PGI Dec 97, June 97)
 - a. Doppler
 - b. Plethysmography
 - c. Venography
 - d. X-ray
26. **The patient falls in high risk group for DVT and pulmonary embolism after?** (MHCET 2016)
 - a. Major burns
 - b. Major surgery age < 40 years
 - c. Major medial illness/cancer
 - d. Major orthopedic surgery/fracture pelvis
27. **For prophylaxis of deep vein thrombosis used is:**
 - a. Warfarin
 - b. Heparin (PGI June 97)
 - c. Pneumatic shocks garment
 - d. Graded stocking
28. **Earliest sign of deep vein thrombosis is:** (DNB 2005, 2001, 2000, AIIMS 87)
 - a. Calf tenderness
 - b. Rise in temperature
 - c. Swelling of calf muscle
 - d. Homan's sign
29. **White leg is due to:** (TN 90)
 - a. Femoral vein thrombosis and lymphatic obstruction
 - b. Deep femoral vein thrombosis
 - c. Lymphatic obstruction only
 - d. None of the above
30. **All of the following are seen in deep vein thrombosis except:**
 - a. Pain
 - b. Discolouration (All India 90)
 - c. Swelling
 - d. Claudication
31. **Which is not used in treatment of superficial venous thrombosis?** (AIIMS 92)
 - a. Immediate anticoagulation
 - b. Rest and elevation
 - c. Analgesics
 - d. Treat associated malignancy
32. **A 60 years old male has been operated for carcinoma of caecum and right hemicolectomy has been done. On the fourth post-operative day, the patient develops fever and pain in the legs. The most important clinical entity one should look for is:** (UPSC 96)
 - a. Urinary tract infection
 - b. Intravenous line infection
 - c. Chest infection
 - d. Deep vein thrombosis
33. **The duration of heparin therapy in deep vein thrombosis is:** (UPPG 96)
 - a. 7-10 days
 - b. 15-20 days
 - c. 3-4 days
 - d. 1 month
34. **Most common site for venous thrombosis:** (JIPMER 98)
 - a. Popliteal vein
 - b. Soleal vein
 - c. Femoral vein
 - d. Internal iliac vein
35. **The most common vein to get thrombosed:** (AIIMS 99)
 - a. Long saphenous
 - b. Short saphenous
 - c. Both
 - d. Posterior tibial
36. **In DVT all are seen except:** (CMC 2001)
 - a. High fever
 - b. Increased temperature at site
 - c. Pain
 - d. Tenderenss
37. **In a patient on anticoagulant therapy, the INR is maintained at:** (UPSC 2002)
 - a. 1.5-2.5 times the normal
 - b. 2.5-3.5 times the normal
 - c. 3.5-4.5 times the normal
 - d. 4.5-5.5 times the normal
38. **The initial therapy of documented deep venous thrombosis in a post operative case is:** (NEET 2003, Karnataka 2003)
 - a. Subcutaneous heparin therapy
 - b. Intravenous heparin therapy
 - c. Thrombolytic therapy with urokinase
 - d. Aspirin therapy
39. **All are done for a case of deep vein thrombosis except:**
 - a. Thrombolytic therapy
 - b. Bandage (MAHE 07)
 - c. Heparin
 - d. Bed rest
40. **Which one of the following is the investigation of choice for suspected deep vein thrombosis of the lower extremity?** (UPSC 2007)
 - a. Radioactive labeled fibrinogen uptake
 - b. Ascending contrast phlebography
 - c. D-dimer estimation
 - d. Duplex ultrasonography
41. **All of the following are true regarding DVT except:**
 - a. Pulmonary emboli is the immediate risk
 - b. May lead to lung infarction (MCI March 2008)
 - c. Associated with deficiency of protein C
 - d. Prior history of DVT is an important risk factor

VARICOSE VEINS

42. **'SEPS' is a procedure used for:** (All India 2009)
 - a. Veins
 - b. Arteries
 - c. Lymphatics
 - d. AV fistula
43. **The most common complication of varicose vein stripping is:** (DPG 2011)
 - a. Infection
 - b. Hemorrhage
 - c. Ecchymosis
 - d. Thromboembolism

44. Drug used for sclerotherapy of varicose veins are the following except: (MCI Sept 2007)
- Ethanolamine oleate
 - Polidocanol
 - Ethanol
 - Sodium tetradecyl sulfate
45. True about venous ulcer (PGI Nov 2010)
- Always stripping done
 - Always examine deep venous system
 - Biopsy should be taken from chronic ulcer
 - Associated with Klippel-Trenunay syndrome
46. Treatment of a long-standing non-healing venous leg ulcer with venous leg ulcer with varicose veins in a patient unwilling for surgery or who is inoperable: (MHSGMCET 2006)
- Antibiotic therapy
 - Bandaging
 - Surgical intervention
 - Haemorrhilogue therapy
47. TRIVEX is a percutaneous technique of: (MHSGMCET 2009)
- Intravenous intraluminal destruction of vein by ablation catheter
 - Intravenous intraluminal injection of sclerosant like sodium tetradecyl sulphate
 - Removal of vein by suction following injection of fluid
 - Stripping of veins
48. In varicose veins the flow in incompetent perforators is: (MHSSMCET 2006)
- From superficial to deep to
 - From deep to superficial
 - No flow
 - Can be to and for
49. Varicose veins of size less than ____ can be best treated by sclerotherapy: (MHSSMCET 2007)
- 2 mm
 - 3 mm
 - 4 mm
 - 6 mm
50. Amount of sclerosant used in treatment of varicose veins: (MHSSMCET 2008)
- 0.5 ml
 - 2 ml
 - 4 ml
 - 8 ml
51. Varicose veins are seen in: (PGI June 2002)
- DVT
 - Superficial venous thrombosis
 - AV fistula
 - Prolonged standing
 - Obesity
52. Brodie-Tredelenburg test is positive in: (PGI June 2002, MHSGMCET 2001)
- Sapheno-Femoral incompetence
 - Perforator competence above knee
 - Deep vein incompetence
 - Perforator competence below knee
53. Most commonly varicose veins are seen with: (AIIMS June 99)
- Long saphenous vein
 - Short saphenous vein
 - Both
 - Popliteal and femoral vein
54. Regarding varicose veins, which one of the following statements is true: (AIIMS Nov 2003)
- Over 20% are recurrent varicosities
 - The sural nerve is in danger during stripping of the long saphenous vein
 - The saphenous nerve is closely associated with the short saphenous vein
 - 5% oily phenol is an appropriate sclerosant for venous sclerotherapy
55. Surgery in varicose veins is not attempted in presence of: (AIIMS Nov 93, June 2000)
- Deep vein thrombosis
 - Multiple incompetent perforators
 - Varicose veins with leg ulcer
 - All of the above
56. Which is true regarding Trendelenburg operation?
- Stripping of the superficial varicose vein (PGI Dec 2001)
 - Flush ligation of the superficial varicose vein
 - Ligation of the perforators
 - Ligation of small tributaries at the distal end of superficial varicose vein
 - Ligation of short saphenous vein
57. First treatment of rupture of varicose veins at the ankle should be: (All India 2004)
- Rest in prone position of patient
 - Application of a tourniquet proximally
 - Application of a tourniquet distally
 - Direct pressure and elevation
58. Perforators are not present at: (AIIMS Nov 2007)
- Ankle
 - Medial calf
 - Distal to calf
 - Below inguinal ligament
59. Injection sclerotherapy for varicose veins is by using: (PGI 88)
- Phenol
 - Absolute alcohol
 - 70% alcohol
 - Ethanolamine oleate
60. The following is the commonest site for venous ulcer: (Recent Question 2014)
- Instep of foot
 - Lower 1/3rd leg and ankle
 - Lower 2/3rd of leg
 - Middle 1/3rd of leg
61. The most important perforator of the lower limb is between:
- Long saphenous and posterior tibial vein (All India 92)
 - Short saphenous and posterior tibial vein
 - Short saphenous and popliteal vein
 - Long saphenous and femoral vein
62. An operated case of varicose veins has a recurrence rate of: (AIIMS 80, AP 89)
- About 10%
 - About 25%
 - About 50%
 - Over 60%
63. Operations for varicose veins are best accomplished by: (PGI 81, AIIMS 84, 86)
- Stripping
 - Multiple subcutaneous ligatures
 - Subfascial ligatures
 - Division and ligation at the superficial venous system
64. Cocket and Dodd's operation is for: (UPSC 2008, APPG 96)
- Saphenofemoral flush ligation
 - Subfascial ligation
 - Deep vein thrombosis
 - Diabetic foot
65. Which of the following test is used to detect perforator incompetence in varicose? (JIPMER 2000)
- Trendelenburg test
 - Fegan's test
 - Morissey's test
 - Homan's test
66. Lipodermatosclerosis is most commonly seen at: (DNB 2012)
- Anterior aspect of leg
 - Medial aspect of leg
 - Anterior aspect of thigh
 - Posterior aspect of thigh
67. An intern was doing saphenous cannulation for a burn patient. Then the patient developed sudden onset of pain along the medial border of the corresponding foot. Which nerve must have been accidentally ligated? (AIIMS 2000)
- Sural nerve
 - Deep peroneal nerve
 - Saphenous nerve
 - Genicular nerve

68. **Gold standard diagnostic test in varicose veins is:** (JIPMER 2003)
 a. Photoplethysmography
 b. Duplex imaging
 c. Ultrasonography
 d. Radio-labeled fibrinogen study
69. **Which one of the following reagents is not used as sclerosant in the treatment of bleeding varices?** (ICS 2005)
 a. Ethyl alcohol
 b. Ethanolamine oleate
 c. Phenol
 d. Sodium morrhuate
70. **Ligation of which nerve will lead to parasthesia and pain on the dorsum of foot during venesections of great saphenous vein:** (AIIMS June 2000)
 a. Sural nerve
 b. Geniculate
 c. Saphenous nerve
 d. Deep peroneal nerve
71. **Bisgard treatment is for:** (APPG 96)
 a. Arterial ulcer
 b. Venous ulcer
 c. TAO
 d. Raynaud's phenomenon
72. **For which of the following venous abnormality is surgery indicated?** (PGI Dec 2001)
 a. Deep vein incompetence with DVT
 b. Deep vein competence without DVT
 c. Varicosity > 3 mm in diameter
 d. Varicosity < 3 mm in diameter
 e. Saphenofemoral incompetence
73. **Treatment of choice for a patient presenting with venous ulcer and incompetent perforators:** (DNB 2005)
 a. Stripping of saphenous vein
 b. Subfascial ligation of perforators
 c. Saphenofemoral ligation
 d. Conservative
74. **Patient presents with varicose vein with sapheno-femoral incompetence and normal perforator. Management options include all of the following except:** (AIIMS Nov 2012)
 a. Endovascular stripping
 b. Sclerotherapy
 c. Sapheno-femoral flush ligation
 d. Saphenofemoral flush ligation with stripping
75. **Contraindication for surgery in varicose veins:** (Recent Question 2015)
 a. DVT
 b. Multiple incompetent perforators
 c. Ulcer at ankle
 d. None
76. **Inceap classification for chronic venous disorders, CO stands, CO (zero) for:** (MHCET 2016)
 a. No signs of venous disease
 b. Reticular veins
 c. Varicose veins
 d. Oedema

AV MALFORMATIONS

77. **A patient presented with pulsating varicose veins of the lower limb. Most probable diagnosis is:** (AIIMS Nov 2001)
 a. Klippel-Trenaunay syndrome
 b. Tricuspid regurgitation
 c. DVT
 d. Right ventricular failure

78. **True about Kasabach syndrome:** (PGI Nov 2009)
 a. May be due to complication of portwine stain
 b. Coagulopathy occurs
 c. Due to complication of hemangioma
 d. Thrombocytopenia present
79. **Pulsating varicose vein in young adult is due to:** (AIIMS 92)
 a. Arteriovenous fistula
 b. Sapheno femoral incompetence
 c. Deep vein thrombosis
 d. Abdominal tumour

THROMBOPHLEBITIS

80. **Migratory thrombophlebitis is seen most commonly with:** (PGI June 2002)
 a. Pancreatic carcinoma
 b. Testicular carcinoma
 c. Gastric carcinoma
 d. Breast carcinoma
 e. Liver carcinoma
81. **The most common cause of superficial throm-bophlebitis is:** (AIIMS June 2004)
 a. Trauma
 b. Infection
 c. Varicosities
 d. Intravenous infusion
82. **The most common cause of superficial throm-bophlebitis is:** (All India 2009)
 a. Intravenous catheters/infusion
 b. DVT
 c. Varicose veins
 d. Trauma

MISCELLANEOUS

83. **All of the following are correct about axillary vein thrombosis except:** (All India 2001)
 a. May be caused by a cervical rib
 b. Treated with IV anticoagulant
 c. Embolectomy is done in all cases
 d. May occur following excessive exercise
84. **In obstruction of inferior vena cava there is?** (All India 97)
 a. Prominent thoraco epigastric vein
 b. Caput medusa
 c. Hemorrhoids
 d. Esophageal varices
85. **Calf compartment pressure rise to _____ on walking:** (MHSSMCET 2006)
 a. 20-30 mm Hg
 b. 60-80 mm Hg
 c. 80-100 mm Hg
 d. 200-300 mm Hg
86. **Harvey's sign is:** (DNB 2000)
 a. Transmitted pressure wave on coughing in a varicose vein
 b. Related to the use of venous filling after emptying a length of vein
 c. Loss of hairs from eyebrows
 d. None of the above
87. **May thurner or cockett syndrome involves:** (Recent Questions 2013)
 a. Common iliac artery obstruction
 b. Internal iliac artery obstruction
 c. Internal iliac vein obstruction
 d. Left iliac vein compression
88. **Venous air embolism is most common in which position in surgery:** (Recent Questions 2013)
 a. Sitting
 b. Prone
 c. Lateral
 d. Lithotomy

EXPLANATIONS

HYPERCOAGULABLE STATES AND DVT RISK FACTORS

1. Ans. b. Antiphospholipid antibody syndrome (Ref: Harrison 18/e p462; Sabiston 19/e p1813; Schwartz 10/e p761, 9/e p781; Bailey 26/e p914, 25/e p936)

Risk Factors for Hypercoagulable States/Thrombosis	
Inherited	Acquired
<ul style="list-style-type: none"> Defective inhibition of coagulation factors: <ul style="list-style-type: none"> Factor V Leiden^a (resistant to inhibition by activated protein C) Antithrombin III deficiency^a Protein C or S deficiency^a Prothrombin gene mutation^a (G20210A) Impaired clot lysis: <ul style="list-style-type: none"> Dysfibrinogenemia Plasminogen deficiency^a t-PA deficiency^a PAI-I excess^a Uncertain mechanism: <ul style="list-style-type: none"> Homocystinuria^a High homocysteine levels due to MTHFR mutation^a 	<ul style="list-style-type: none"> Diseases or syndromes: <ul style="list-style-type: none"> Lupus anticoagulant/anticardiolipin syndrome^a Malignancy^a, recent MI^a, infection^a Myeloproliferative disorder Thrombotic thrombocytopenic purpura^a Estrogen^a treatment Hyperlipidemia, Diabetes mellitus^a Hyperviscosity, polycythemia^a Nephrotic syndrome^a Paroxysmal nocturnal hemoglobinuria^a Inflammatory bowel disease^a Behcet's syndrome^a Physiological states: <ul style="list-style-type: none"> Pregnancy (especially post-partum^a) Obesity^a, Immobilization^a, Old age^a Post-operative state^a

2. Ans. d. Lupus anticoagulant 3. Ans. None 4. Ans. c. Antibodies to factor VIII
 5. Ans. a. Lipoprotein A 6. Ans. b. Sickle cell anemia
 7. Ans. b. Factor V Leiden deficiency (Ref: Harrison 18/e p462-463)

- Factors V Leiden mutation or increased factor V Leiden levels are associated with hypercoagulable state (not the factor V Leiden deficiency)

- MC genetic cause for thrombophilia: Factor V Leiden
- MC congenital cause of venous thrombosis: Factor V Leiden
- MC genetic hereditary blood coagulation disorder: Factor V Leiden

8. Ans. c. Hypomagnesemia 9. Ans. d. Dysfibrinogenemia 10. Ans. b. Leiden mutation
 11. Ans. c. Factor V Leiden mutation 12. Ans. b. Hypertension 13. Ans. d. Sickle cell anemia
 14. Ans. a. Tall and thin man 15. Ans. a. Tall and thin man
 16. Ans. a. 30 years female on OCP's; b. Pregnancy; c. Leg paralysis; e. Behcet's disease

DEEP VENOUS THROMBOSIS

17. Ans. a. Hypercoagulability
 (Ref: Harrison 18/e p2171-2174; Sabiston 19/e p1812-1816; Schwartz 10/e p918-927, 9/e p781-789; Bailey 26/e p913-917, 25/e p935-939)

DEEP VENOUS THROMBOSIS

- DVT of the leg is complicated by the immediate risk of pulmonary embolus and sudden death^a.
- Patients are at risk of developing a post-thrombotic limb and venous ulceration^a.

Virchow's Triad

- Three factors described by Virchow are important in the development of venous thrombosis. These are:
 - Endothelial injury^a (vascular injury)
 - Stasis or turbulence of blood flow^a
 - Hypercoagulability of blood^a (thrombophilia)

- **Most important predisposing factor:** Hospital admission^Q for the treatment of a medical or surgical condition.

Pathology

- A **thrombus develops** in the **soleal veins** of the calf, this is likely to **extend up** to the next large venous branch and is **more likely** to **break off** and **embolise**^Q to the lung as a pulmonary embolism.
- **Acute right heart obstruction** may lead to **sudden collapse** and **death**^Q.

- **Lung infarction is rare**^Q as the **lung** has a **dual blood supply** (bronchial and **pulmonary arteries**).

Clinical Features

- **MC presentation of DVT:** **Pain** and **swelling**, especially in the **calf** of one lower limb^Q.
- **Bilateral DVT** is common, occurring in up to 30%^Q.
- **Many patients have no symptoms of thrombosis** and **may first present with signs of a pulmonary embolism**, e.g. pleuritic chest pain, hemoptysis and shortness of breath^Q.
- **Physical signs:** **Mild pitting edema** of the ankle, **dilated surface veins**, a **stiff calf** and **tenderness** over the course of the deep veins.
- **Earliest sign of DVT:** **Calf tenderness**^Q

- **Low-grade fever** may be present, especially in a patient who is having **repeated pulmonary emboli**^Q.

- **Homan's sign:** **Resistance** (not pain) of the **calf muscles** to **forcible dorsiflexion** is not discriminatory and should be abandoned.

Homan's sign	• Resistance (not pain) of the calf muscles to forcible dorsiflexion ^Q
Phlegmasia alba dolens	• Painful white leg ^Q • Obstruction of major deep venous channel ^Q
Phlegmasia cerulea dolens	• Painful blue leg ^Q • Obstruction of both collaterals and deep venous channel ^Q
Moses sign	• Calf tenderness on direct pressure on the calf ^Q
Pratt's sign	• Calf tenderness on squeezing the calf from the sides ^Q

Diagnosis

- **D-dimer measurement:** If **normal**, no indication for further investigation^Q but, if raised, a duplex ultrasound examination of the deep veins should be performed.
- **Duplex ultrasound:** **Investigation of choice** for diagnosis of DVT (Filling defects in flow and **lack of compressibility** indicate the presence of a thrombosis^Q).
- **Ascending venography:** Shows **thrombus** as a **filling defect**, is now **rarely required**^Q.

Treatment

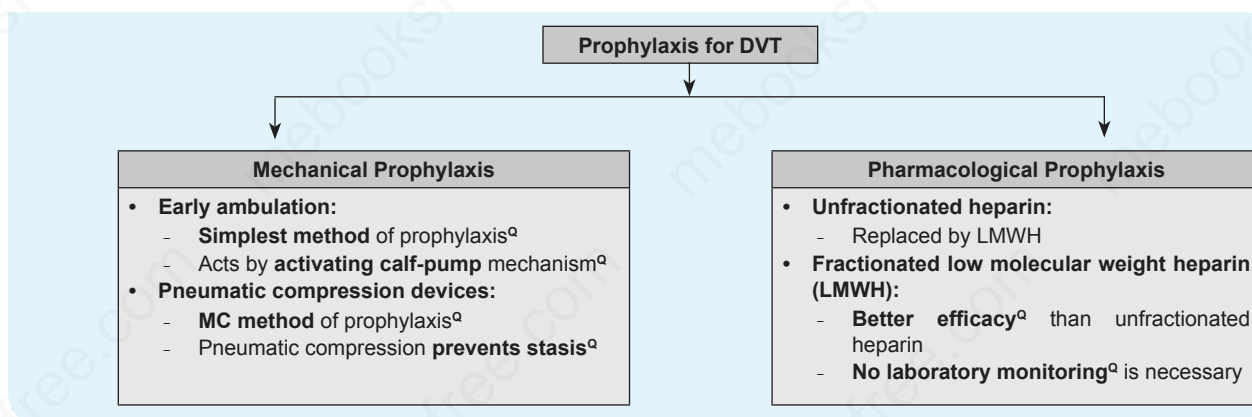
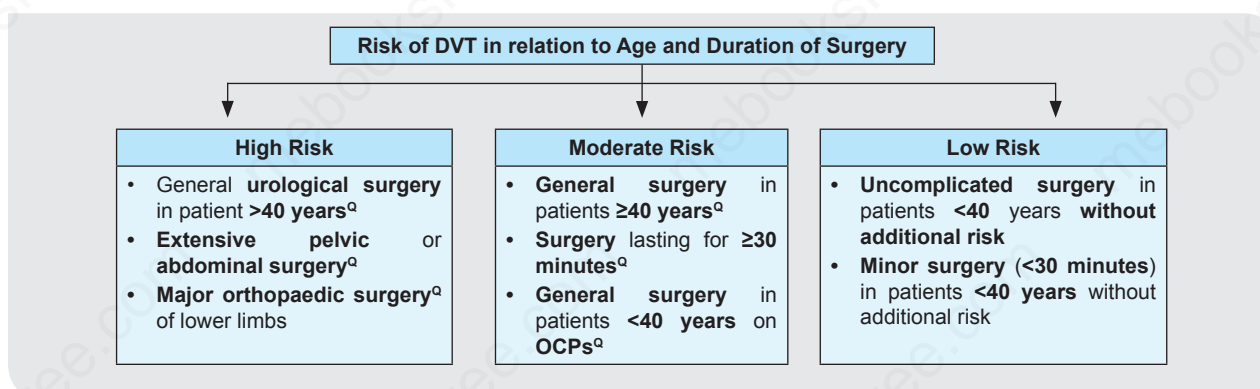
- **Confirmed DVT on duplex imaging:** Start **subcutaneous LMWH** and **rapid anticoagulation with warfarin** unless there is a specific contraindication^Q.

- **Duration of heparin** should be **at least 5 days**^Q.
- **Warfarin** is usually started at a dose of **10 mg** on **day one**, **10 mg** on **day two** and **5 mg** on **day three**^Q.
- **PT on day 3** guides the **maintenance dose** of warfarin.

- **Thrombolysis:** In **iliac vein thrombosis**, especially if **seen early** and limb is **extremely swollen**^Q.
- A **minimum treatment time of anticoagulation** advocated in DVT is **3 months**^Q.

18. Ans. d. Systemic heparin is only method for DVT prophylaxis (Ref: Harrison 18/e p2171-2174; 17/e p1651-1655; Sabiston 19/e p1813-1816; Schwartz 10/e p918-927, 9/e p781-783; Bailey 26/e p916-917, 25/e p936-939)

- The patients who has undergone either **major abdominal surgery** or **major orthopedic surgery**, has sustained **major trauma** or has **prolonged immobility** (>3 days) represents an **elevated risk** for the development of **venous thromboembolism**^Q.
- Patients who have undergone **total hip replacement**, **total knee replacement**, or **cancer surgery** will benefit from **extended pharmacologic prophylaxis** for a total of **4-6 weeks**^Q.
- If **untreated**, upto **25% of calf vein thrombosis** may progress to **proximal deep veins** of the leg, where the **incidence of chronic venous insufficiency** is **25%** and that of **pulmonary embolism** is **10%**^Q.



- Unfractionated heparin and warfarin are rarely used in the prophylaxis of DVT^o.

19. Ans. c. Femoral (Ref: Sabiston 19/e p1812-1813; Schwartz 9/e p781; Bailey 26/e p915, 25/e p935-939)

- MC site of DVT: Calf veins (soleal veins)^o
- MC site thrombosis for pulmonary thromboembolism: Femoropopliteal veins^o

- Calf veins are the most common site of DVT in post-operative period, but risk of embolism from calf venous thrombosis is extremely low^o.
- DVT of femoropopliteal veins are the most common site of pulmonary thromboembolism^o.

20. Ans. a. High fever 21. Ans. d. Venous thrombosis 22. Ans. b. Subungual melanoma
23. Ans. a. Total hip replacement 24. Ans. a. Thrombosis of leg veins
25. Ans. a. Doppler 26. Ans. c. Prophylactic heparin
27. Ans. b. Heparin; c. Pneumatic shock garments, d. Graded stocking
28. Ans. a. Calf tenderness 29. Ans. b. Deep femoral vein thrombosis
30. Ans. d. Claudication 31. Ans. a. Immediate anticoagulation; b. Rest and elevation
32. Ans. d. Deep vein thrombosis 33. Ans. c. 3-4 days 34. Ans. b. Soleal vein
35. Ans. d. Posterior tibial 36. Ans. a. High fever
37. Ans. b. 2.5-3.5 times the normal (Ref: Sabiston 19/e p1815; Schwartz 9/e p784-786)

Anticoagulant	Parameter	Goal (times control values)
Unfractionated heparin	aPTT ^a	1.5-2.5 ^a
Warfarin	PT or INR ^a	2.0-3.0 ^a

38. Ans. b. Intravenous heparin therapy

(Ref: Harrison 18/e p2174-2176; Sabiston 19/e p1815; Schwartz 10/e p199, 921-923, 9/e p784-786; Bailey 26/e p917, 25/e p938-939)

ANTITHROMBOTIC THERAPY IN DVT

- Any venous thrombosis involving the femoropopliteal system is treated with full anticoagulation^Q.
- Traditionally, the treatment of DVT centers around heparin treatment to maintain the PTT at 60 to 80 seconds, followed by warfarin therapy to obtain an INR of 2.5 to 3.0^Q.
- This initial therapy usually is continued for at least 5 days^Q, while oral vitamin K antagonists are being simultaneously administered.

Unfractionated Heparin

- UFH therapy is most commonly administered with an initial IV bolus of 80 units/kg or 5000 units^Q.
- Initial bolus is followed by a continuous IV drip, initially at 18 units/kg per hour^Q or 1300 units per hour^Q.
- The half-life of IV UFH ranges from 45-90 minutes and is dose dependent^Q.
- Level of antithrombotic therapy should be monitored every 6 hours using aPTT, with the goal range of 1.5 to 2.5 times control values^Q.

39. Ans. d. Bed rest

40. Ans. d. Duplex ultrasonography

41. Ans. b. May lead to lung infarction

VARICOSE VEINS

42. Ans. a. Veins (Ref: Sabiston 19/e p1809; Schwartz 10/e p929-930, 9/e p791; Bailey 26/e p911, 25/e p931)

SUBFASCIAL ENDOSCOPIC PERFORATOR VEIN SURGERY (SEPS)

- SEPS is a new endoscopic technique for the management of chronic venous insufficiency due to incompetent perforator veins^Q.
- SEPS involves insertion of a rigid endoscope through the skin and superficial fascia to a plane above the muscle, such that perforator veins are visible as they exit the muscles.
- These perforator veins are dissected free from surrounding tissue and closed with the help of metal clips.

43. Ans. c. Ecchymosis (Ref: Sabiston 19/e p1803-1811; Schwartz 10/e p929-930, 9/e p790-792; Bailey 26/e p903-913, 25/e p927-932)

VARICOSE VEINS

- Varicose veins are dilated, tortuous elongated superficial veins^Q ≥ 3 mm in diameter measured in upright position with demonstrable reflux.
- Most develop in the tributaries of the greater and lesser saphenous veins, which are usually dilated but rarely varicose themselves.
 - The usual distribution of varicose veins is below the knee in branches of greater saphenous system^Q.
- Varicosities in the thigh: Long saphenous incompetence^Q
- Varicosities on the back of the leg: Short saphenous incompetence^Q

Primary Varicose Veins	Secondary Varicose Veins
<ul style="list-style-type: none"> • More common^Q • Due to congenital predisposition with occupational reinforcement^Q • Decreased number or defective valves^Q 	<ul style="list-style-type: none"> • Less common • Arises from destruction or dysfunction of valves caused by: <ul style="list-style-type: none"> - Trauma^Q - DVT^Q - AV fistula^Q - Non-traumatic proximal venous obstruction (pregnancy, pelvic tumor)

Risk Factors for Varicose Veins

- | | |
|---|--|
| <ul style="list-style-type: none"> • Female sex^Q • Pregnancy (especially multiparity^Q) • Pelvic tumors^Q • Family history^Q | <ul style="list-style-type: none"> • AV fistula^Q • DVT^Q • Prolonged standing^Q • Obesity^Q |
|---|--|

Pathophysiology

- Defective connective tissue and smooth muscle in the vein wall leading to a secondary incompetence of the valves^Q

Clinical Features

- **MC symptom:** Dull aching pain in the veins at the end of the day, after prolonged standing^Q
- Other symptoms: Ankle swelling, itching, bleeding, superficial thrombophlebitis, eczema, lipodermatosclerosis and ulceration^Q.

Diagnosis

- **Duplex ultrasound:** Investigation of choice for diagnosis of varicose veins^Q
- **Varicography:** Useful investigation in recurrent varicose veins or complex anatomy^Q
- **Venography:** Not used as a standard investigation in varicose veins, useful if the duplex scan indicates, but cannot confirm, the presence of post-thrombotic change^Q.

Treatment

- Patients without symptoms or signs of lipodermatosclerosis or ulceration: Reassurance^Q
- Elastic compression stockings: For varicose veins with post-thrombotic damage^Q

- **Bisgard's Regime:** Limb elevation + Compression stockings + Massage for varicose ulcers^Q

Indications for Varicose Vein Intervention

- | | |
|--|--|
| <ul style="list-style-type: none"> • Cosmesis^Q • Symptoms refractory to conservative therapy^Q • Bleeding from a varix | <ul style="list-style-type: none"> • Superficial thrombophlebitis^Q • Lipodermatosclerosis^Q • Venous stasis ulcer^Q |
|--|--|

- A previous DVT usually contraindicates varicose vein surgery^Q

- DVT is a **contraindication** for the treatment of varicose veins^Q.
- Varicose vein surgery should **never be attempted** in a case where DVT exists along with varicose veins, because in these cases, superficial veins are the only valved venous pathway and excising them will only aggravate the condition^Q.

- Laser and radiofrequency ablation do not provide 'flush' occlusion of the saphenous vein, often leaving tributaries that would always be divided at surgery.

Treatment of Varicose Veins

Treatment of Varicose Veins	
Injection sclerotherapy	<ul style="list-style-type: none"> • Sodium tetradecyl sulphate is most commonly used^Q • Destroys lipid membranes of endothelial cells causing them to shed, leading to thrombosis, fibrosis and sclerosis^Q. • Not effective at eradicating varicosities in the presence of major saphenous incompetence^Q • Useful for dealing with minor varicosities (<3 mm^Q) and recurrences in the calf and lower leg
Surgical Treatment	<ul style="list-style-type: none"> • Ligate the saphenofemoral and/or saphenopopliteal junctions and remove major part of the incompetent trunk^Q
Radiofrequency ablation	<ul style="list-style-type: none"> • Destroy the endothelial lining^Q
Endovenous laser ablation	<ul style="list-style-type: none"> • Causes endothelial damage^Q

Complications of varicose vein surgery

- **Recurrence (MC):** Incidence of recurrence after surgery is upto 10%^Q.
- **Hematoma or Ecchymosis:** MC cause of discomfort^Q after varicose vein surgery
- Sensory nerve injury

- **Greater saphenous vein** should only be **stripped to just below the knee** to avoid damage to the accompanying **saphenous nerve**^Q
- **Sural nerve** must be **carefully dissected off the lesser saphenous vein** at the ankle^Q.

'CEAP' Classification of Chronic Lower Extremity Venous Disease	
C	• Clinical signs (grade ₀₋₆), supplemented by "A" for asymptomatic and "S" for symptomatic presentation
E	• Etiologic classification (congenital, primary, secondary)
A	• Anatomic distribution (superficial, deep, or perforator, alone or in combination)
P	• Pathophysiologic dysfunction (reflux or obstruction, alone or in combination)

44. Ans. c. **Ethanol** (Ref: Sabiston 19/e p1809; Schwartz 9/e p791; Bailey 26/e p908-909, 25/e p929-930)

SCLEROSING AGENTS

- These are **irritants** causing **inflammation**, **coagulation** and ultimately **fibrosis**, when injected into **hemorrhoids** or **varicose veins**^Q.
- Used only for **local injection**

Sclerosing Agents	
<ul style="list-style-type: none"> • Phenol^Q (5%) in almond oil or peanut oil^Q • Ethanolamine oleate^Q (5%) in 25% glycerin and 2% benzyl alcohol • Polidocanol^Q (3%) 	<ul style="list-style-type: none"> • Sodium tetradecyl sulphate^Q (3%) with benzyl alcohol (2%) • Hypertonic saline^Q

45. Ans. b. Always examine deep venous system; c. Biopsy should be taken from chronic ulcer; d. Associated with Klippel-Trenaunay syndrome (Ref: CSDT 11/e p874, 884; Sabiston 19/e p1806-1807; Schwartz 9/e p792-794; Bailey 26/e p917-919, 25/e p933-935)

- SCC (Marjolin's ulcer) may occur in **long standing chronic ulcer**. So, **biopsy** should be taken to **rule out malignancy**^Q.
- **DVT** is one of the **main predisposing factors** for **development of venous ulcer**^Q.
- **Venous ulcer** is **not always associated with varicose veins**^Q.
- **Most venous ulcers improve with Bisdard's Regime**^Q (Limb elevation + Compression stockings + Massage)
- **Klippel-Trenaunay syndrome** is associated with **varicose veins**, **limb hypertrophy** and a **cutaneous birthmark** (port-wine stain or venous malformation). **Deep venous system** is **anomalous or absent**, **saphenous vein stripping** can be **hazardous**^Q.

46. Ans. b. Bandaging (Ref: Sabiston 19/e p1806-1807; Schwartz 9/e p792-794; Bailey 25/e p933-935)

VENOUS ULCERS

- Venous disease is responsible for **60-70% of all ulcers** in the **lower leg**.

Causes of Leg Ulcers	
<ul style="list-style-type: none"> • Venous disease: Superficial incompetence; deep venous damage (post-thrombotic) • Arterial ischemic ulcers • Rheumatoid ulcers 	<ul style="list-style-type: none"> • Traumatic ulcers • Neuropathic ulcers (diabetes) • Neoplastic ulcers (SCC and BCC)

Etiology

- **Fibrin cuff theory**: High venous pressure → Pericapillary infiltrate → Fibrin → Fibrosis → Cuffs → Diffusion block → Tissue damage^Q
- **White cell trapping**: White cell 'trapping' → Reactive oxygen species → Free radicals → Tissue damage^Q.

- At present, **ambulatory venous hypertension** is the **only accepted cause of ulceration**^Q.

Clinical features

- **Venous ulcer**: **Sloping edge**, **base** contains **granulation tissue**^Q covered by slough and exudate.
- Any **elevation of the ulcer edge** should indicate the **need for a biopsy** to **exclude a carcinoma** (SCC or BCC).

- Venous ulcer of the leg **characteristically develops** in the skin of the **gaiter region**^Q, the **area between** muscles of the calf and ankle
- **Majority of ulcers** develop on the **medial side** of the **calf**^Q
- **Ulcers associated with lesser saphenous incompetence** often develop on the **lateral side** of the **leg**^Q.

- Almost **all venous ulcers** have surrounding **lipodermatosclerosis** (**thickening**, **pigmentation**, **inflammation** and **induration** of calf skin^Q)

- **Pigmentation** comes from **hemosiderin** and **melanin**

- Presence of an **ankle flare** suggests **venous hypertension**^Q.
- **Champagne bottle leg** is seen in **varicose veins**^Q.

Diagnosis

- **Duplex ultrasound**: Assess the state of the deep and superficial veins (IOC)^Q
- **Bipedal ascending phlebography**: Detect obstruction and **post-thrombotic changes** missed by the duplex scan^Q

Management

- **Probable venous ulcer**: Patients are initially treated by a **compression bandaging regimen**^Q
- A **multilayered elastic compression bandaging system** has been shown to be effective (**Charing Cross four-layer bandage**), as has a **rigid multilayered system** (**Steripaste three layer bandage**)^Q.

Prevention of recurrence

- **Elastic stockings** should be prescribed for all patients with evidence of **post-thrombotic deep vein damage** and these remain an **alternative treatment** for patients with **superficial venous disease** who **decline intervention**^Q.

Prognosis

- There is a **20-30% incidence of re-ulceration** by 5 years^Q.
- The **greatest risk of re-ulceration** is in the **post-thrombotic leg**^Q.

47. Ans. a. Intravenous intraluminal destruction of vein by ablation catheter (Ref: Sabiston 19/e p1809; Harrison 18/e p2074)

TRANSILLUMINATED POWERED PHLEBECTOMY (TIPP) USING TRIVEX

- **TIPP** involves an **irrigated transilluminator**, passed deep to the varicosities, and a powered suction resector, each introduced through a skin incision.
- On activation, the **vein is sucked into the resector under direct vision**, morcellated and removed by suction.
- **Trivex system** uses two components.
- **First instrument illuminates the varicose veins** through the skin using advanced fiber optic technology and the **vein resector** is then **guided next to the vein** underneath the skin^Q.
- **Suction draws the vein into tip of the vein resector** while a rotating blade effectively removes the leg vein^Q.
- With this new varicose vein treatment, **large clusters of varicose veins** can be **accurately removed** through a **minimal number of small incisions** and is far more effective than other forms of varicose vein surgery.

48. Ans. b. Form deep to superficial (Ref: Bailey 25/e p928)

- In **varicose veins**, the **flow in the incompetent perforators** is **reversed** and goes **from deep to superficial veins**^Q.

49. Ans. b. 3 mm (Ref: Sabiston 19/e p; Schwartz 9/e p791; Bailey 26/e p908-909, 25/e p929-930)

- **Sclerotherapy** is useful for dealing with **minor varicosities** (<3 mm^Q) and **recurrences** in the **calf and lower leg**^Q.
- **Amount of sclerosant used** in treatment of varicose veins is **0.5 ml**^Q.

50. Ans. a. 0.5 ml

51. Ans. a. DVT; c. AV fistula; d. Prolonged standing; e. Obesity

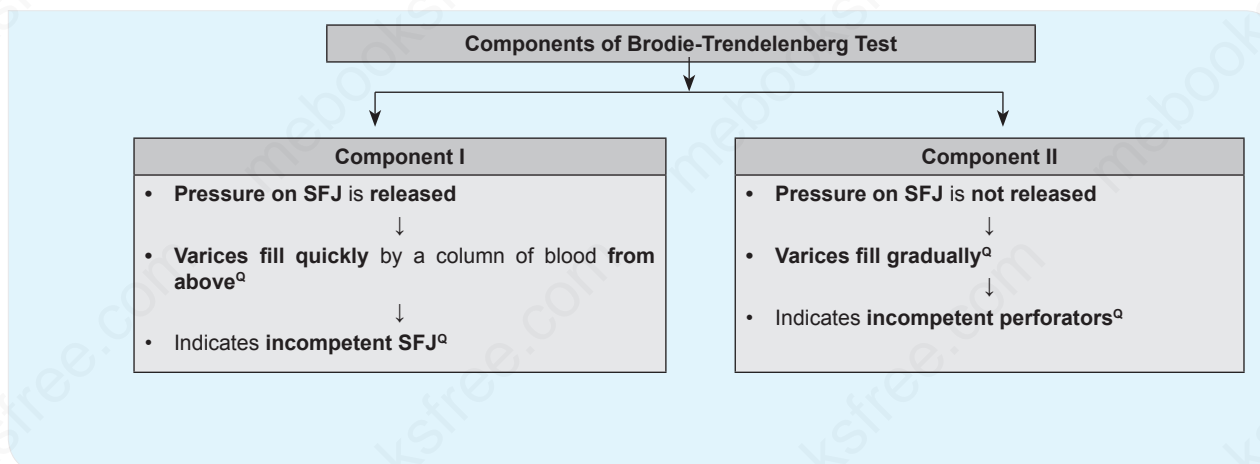
52. Ans. a. Sapheno-Femoral incompetence (Ref: Sabiston 19/e p1805; Bailey 25/e p927-928)

BRODIE-TRENDELENBERG TEST

- **Brodie-Trendelenberg test** is **positive** in:
 - Incompetent sapheno-femoral junction (SFJ)^Q
 - Incompetent perforators or communicating veins^Q

Procedure

- Test is performed in two ways.
- In both the methods the patient is first placed in the recumbent position and his legs are raised to empty the veins.
- The SFJ is now compressed with the thumb of the clinician and the patient is asked to stand up quickly.



Tests for Varicose Veins	
Morrissey's test	• Cough impulse test ^Q
Perthe's test	<ul style="list-style-type: none"> • Affected lower extremity is wrapped with elastic bandage and patient is instructed to move around and exercise. • Increase in size of the varices indicates incompetence of deep venous system^Q • Severe crampy pain is suggestive of deep venous obstruction^Q
Modified Perthe's test	<ul style="list-style-type: none"> • Tourniquet is applied around the upper part of the thigh and patient is asked to walk quickly with tourniquet in the place • Severe crampy pain is suggestive of deep venous obstruction^Q
Schwartz test	• In long standing varicose veins if the lower part of varicosity is tapped , an impulse is felt at the saphenous opening^Q
Fegan's test	• Palpation to find the fascial defects to locate incompetent perforators^Q

53. Ans. a. Long saphenous vein (Ref: Sabiston 19/e p; Schwartz 9/e p791; Bailey 26/e p901, 25/e p927)

- The usual distribution of varicose veins is below the knee in branches of greater saphenous system^Q.

54. Ans. d. 5% oily phenol is an appropriate sclerosant for venous sclerotherapy

55. Ans. a. Deep vein thrombosis (Ref: Sabiston 19/e p1809; Schwartz 9/e p791; Bailey 26/e p907, 25/e p933)

- DVT is a contraindication for the treatment of varicose veins^Q.
- Varicose vein surgery should never be attempted in a case where DVT exists along with varicose veins, because in these cases, superficial veins are the only valved venous pathway and excising them will only aggravate the condition^Q.

56. Ans. b. Flush ligation of the superficial varicose vein

(Ref: Sabiston 19/e p1809-1811; Schwartz 10/e p917-918, 9/e p792; Bailey 26/e p910-911, 25/e p930-931)

TRENDELENBERG OPERATION

- Consists of saphenofemoral junction flush ligation and greater saphenous vein (GSV) stripping^Q
 - All four tributaries (superficial inferior epigastric, superficial circumflex iliac, deep and superficial external pudendal veins) is divided^Q
- Ligate the GSV deep to all tributaries flush with the common femoral vein^Q
- Greater saphenous vein should only be stripped to just below the knee to avoid damage to the accompanying saphenous nerve^Q

57. Ans. d. Direct pressure and elevation (Ref: Oxford Textbook of Surgery 2/e p1000)

- Varicose veins around the ankle, foot and lower leg especially in elderly are highly vulnerable to hemorrhage, which may occur with minor trauma or spontaneously when patients is up and about^Q.
 - The ensuing hemorrhage may be copious but is easily stopped by finger pressure or when patient lies down with foot elevated and a firm pad and bandage is applied^Q.
- The treatment must be completed by elimination of affected varicosity which may be achieved by compression sclerotherapy.

58. Ans. d. Below inguinal ligament (Ref: Sabiston 19/e p1803; Schwartz 9/e p778; Bailey 26/e p902, 25/e p925-926)

PERFORATORS LOCATION (IN CBD HUNTERS)

- Below the medial malleolus (Inframalleolar perforators/ May or Kuster)
- In the medial calf (Cockett's perforators^Q)
- Just below the knee (Boyd's perforators^Q)
- Just above the knee (Dodd's perforators^Q)
- At the level of adductor canal (Hunterian perforators^Q)

59. Ans. a. Phenol; d. Ethanolamine oleate

60. Ans. b. Lower 1/3rd leg and ankle

61. Ans. d. Long saphenous and femoral vein

62. Ans. a. About 10%

63. Ans. a. Stripping

64. Ans. b. Subfascial ligation (Ref: www.ncbi.nlm.nih.gov/pubmed/4855162)

- Cockett and Dodd Operation: Sub-fascial ligation of perforators

65. Ans. a. Trendelenburg test

66. Ans. b. Medial aspect of leg (Ref: Sabiston 19/e p1806-1807; Bailey 26/e p905)

LIPODERMATOSCLEROSIS

- Lipodermatosclerosis is the name given to the skin changes seen in chronic venous insufficiency.
- Components of lipodermatosclerosis:
 - Pigmented skin
 - Inflamed subcutaneous tissue
 - Elevated venous pressure facilitates the extravasation of the RBCs and fluid leading to inflammation
- The pigmentation is due to fixation of hemosiderin in the tissue
- It is most commonly seen on gaiter area (above medial malleolus)

67. Ans. c. Saphenous nerve

68. Ans. b. Duplex imaging

69. Ans. a. Ethyl alcohol

70. Ans. c. Saphenous nerve

71. Ans. b. Venous ulcer

72. Ans. b. Deep vein competence without DVT; c. Varicosity >3 mm in diameter; e. Saphenofemoral incompetence (Ref: Sabiston 19/e p1809-1811; Schwartz 10/e p259,917,929, 9/e p791-792; Bailey 25/e p929-932)

- Surgery is indicated for SFJ incompetence^Q.
- Varicose vein surgery is contraindicated in presence of DVT^Q
- Varicosities with diameter >3 mm: Surgery^Q
- Varicosities with diameter <3 mm: Sclerotherapy^Q

73. Ans. b. Subfascial ligation of perforators

74. Ans. b. Sclerotherapy (Ref: Sabiston 19/e p1803-1811; Schwartz 9/e p790-792; Bailey 25/e p927-932)

Injection sclerotherapy is useful for dealing with minor varicosities (<3 mm^Q) and recurrences in the calf and lower leg. Though it's a treatment option for varicose vein, but for a patient of varicose vein with sapheno-femoral incompetence and normal perforator, this will be least preferred amongst the given options.

Treatment of Varicose Veins

- Saphenofemoral flush ligation with ligation of tributaries and stripping of major part of the incompetent trunk^Q

75. Ans. a. DVT

76. Ans. a. No signs of venous

AV MALFORMATIONS

77. Ans. a. Klippel-Trenaunay syndrome (Ref: Schwartz 10/e p1850, 9/e p1667; Bailey 26/e p919, 25/e p940)

KLIPPEL-TRENAUNAY SYNDROME

Characterized by

- | | |
|---|--|
| <ul style="list-style-type: none"> • Congenital AV fistula^a • Cutaneous hemangioma^a • Varicose veins^a | <ul style="list-style-type: none"> • Hypertrophy of involved extremity^a • Absence of deep venous system^a |
|---|--|

Management

- Most patients with Klippel-Trenaunay syndrome should be treated conservatively with elastic compression hosiery^Q
- Pathological superficial veins should not be removed^Q without evidence of an intact deep system.

- **Parkes Weber syndrome:** Multiple AV fistulae causing venous hypertension, ulceration and high-output cardiac failure^Q.

78. Ans. b. Coagulopathy occurs; c. Due to complication of hemangioma; d. Thrombocytopenia present (Ref: Sabiston 19/e p1452; Schwartz 10/e p1850, 9/e p1667; Bailey 26/e p598, 25/e p617)

KASABACH-MERITT SYNDROME

- Characterized by:
 - Thrombocytopenia^Q
 - Consumptive coagulopathy^Q
 - Microangiopathic hemolytic anemia^Q
 - Enlarging vascular lesion (Hemangioma or AV malformation^Q)

Pathology

- Vascular lesion (Hemangioma or AV malformation) triggers an intravascular coagulation with platelet trapping and consequent thrombocytopenia, and an activation and consumption of coagulation factors^Q.

Management

- Treatment options: Embolization, external compression bandages^Q
- Drugs: Corticosteroids, vincristine

79. Ans. a. Arteriovenous fistula

THROMBOPHLEBITIS

80. Ans. a. Pancreatic carcinoma; c. Gastric carcinoma (Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927, 9/e p789; Bailey 26/e p913, 25/e p939)

Malignancies associated with Migratory Thrombophlebitis

- | | |
|---------------------------------|--------------------------------|
| • CA pancreas (MC) ^Q | • Prostate cancer ^Q |
| • CA lung ^Q | • Ovarian cancer ^Q |
| • GI malignancies ^Q | • Lymphoma ^Q |

81. Ans. d. Intravenous infusion (Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927-928, 9/e p789; Bailey 26/e p913, 25/e p939)

SUPERFICIAL THROMBOPHLEBITIS

- This is a superficial venous thrombosis, most commonly caused by infusions of IV fluids

Causes of Superficial Thrombophlebitis

- | | |
|--|---------------------------------------|
| • Venepuncture and IV infusion (MC) ^Q | • Buerger's disease ^Q |
| • Trauma ^Q (especially to varicose veins) | • Malignancy (Pancreas ^Q) |

Clinical Features

- Surface vein feels solid and tender on palpation.
- Overlying skin may be attached to the vein and in the early stages may be erythematous before gradually turning brown.
- A linear segment of vein can be palpated once the inflammation has subsided^Q.

- The acute inflammation strongly adhere the thrombus to the venous wall, so no thromboembolic episodes are seen^Q.

Treatment

- Most patients are treated with NSAIDs and condition resolves spontaneously^Q.

82. Ans. a. Intravenous catheters/infusion

MISCELLANEOUS

83. Ans. c. Embolectomy is done in all cases (Ref: Sabiston 19/e p1816; Schwartz 10/e p928-929, 9/e p790; Bailey 26/e p919-920, 25/e p940)

AXILLARY-SUBCLAVIAN VEIN THROMBOSES (ASVT)

- Upper extremity DVT is much less common than its lower extremity counterpart
- It is a serious problem; pulmonary embolism occurs in up to one third of all patients with an upper extremity DVT^Q.
- Upper extremity DVT refers to thrombosis of the axillary or subclavian veins^Q.
- ASVT are classified into two forms.

Primary ASVT	Secondary ASVT
<ul style="list-style-type: none"> Less common No clear cause for the thrombosis is readily identifiable at initial evaluation^Q. History of performing prolonged, repetitive motion activities^Q, which results in damage to the subclavian vein, usually where it passes between the head of the clavicle and 1st rib^Q. Also known as venous thoracic outlet syndrome, effort thrombosis, and Paget-Schroetter syndrome^Q. 	<ul style="list-style-type: none"> More common^Q Associated with an easily identified cause such as an indwelling catheter or a hypercoagulable state^Q. Over 30% of patients with tunneled subclavian vein access devices develop ASVT^Q.

Clinical Features

- A patient with ASVT may be asymptomatic or may present with varying degrees of upper extremity edema and tenderness^Q.
- Classic findings: Unilateral swelling, pain, extremity discomfort, erythema, and a palpable cord^Q.

Diagnosis

- Duplex ultrasonography confirms the diagnosis^Q.

Treatment

- Anticoagulation therapy should be initiated once ASVT is diagnosed to prevent PE and decrease symptoms^Q.

- Patients presenting with acute symptomatic primary ASVT may be candidates for catheter-directed thrombolytic therapy^Q.

- Adjuvant procedures after thrombolytic therapy may include cervical or first rib resection for thoracic outlet abnormalities, surgical venous reconstruction, and balloon angioplasty for residual venous stenosis^Q.

84. Ans. a. Prominent thoraco epigastric vein (Ref: BDC 4/e vol II/197)

- Thoracoepigastric veins are important connection between the veins of upper and lower limbs and these get prominent in IVC obstruction^Q.

85. Ans. d. 200-300 mm Hg (Ref: Bailey 25/e p925)

- On standing, the arterial blood pressure at the ankle rises by 80-100 mm Hg^Q.
- The pressure within the calf compartment rises to 200-300 mm Hg^Q during walking, which is more than enough to propel the blood in the direction of heart.

86. Ans. b. Related to the use of venous filling after emptying a length of vein

Harvey's Sign
<ul style="list-style-type: none"> Related to the use of venous filling after emptying a length of vein Delayed venous refilling is called Harvey's Sign

87. Ans. d. Left iliac vein compression

MAY-THURNER SYNDROME/COCKETT SYNDROME/ILIOCAVAL/ILIAC VEIN COMPRESSION SYNDROME.

- Occurs due to compression of left iliac vein by overriding right iliac artery.
- It result in left iliofemoral deep vein thrombosis.

88. Ans. a. Sitting (Ref: ncbi.nlm.nih.gov/pmc/articles/PMC 2580000)

- Venous air embolism is a potential hazard whenever the operative site is above the level of patients heart.
- The 'sitting' position and its modification "beach chair" positions are associated with a greater incidence of venous air embolism.

Lymphatic System

MULTIPLE CHOICE QUESTIONS

LYMPHEDEMA

- True about primary lymphedema:** (PGI Nov 2010)
 - Lymphangiosarcoma may occur
 - Associated with Milroy's disease
 - Onset between 2-35 years indicates lymphedema tarda
 - Onset >35 years indicates praecox variety
 - Prevalence is 2%
- Which of the following is not an operation of congenital lymphedema?** (MHSGMCET 2009)
 - Homan's operation
 - Charles's operation
 - de Quervain's cross red operation
 - Sistrunk's operation
- In Neibulowitz surgery what is done?** (MHSSMCET 2006, 2008)
 - Skin bridge
 - Lymph node with vein anastomosis
 - Ileal mucosal patch
 - All of the above
- Most common type of primary lymphedema is:** (DNB 2010)
 - Lymphedema congenita
 - Lymphedema precox
 - Lymphedema tarda
 - None
- In India, what is the most common cause of unilateral lymphedema of lower limb?** (UPSC 2007)
 - Lymphedema tarda
 - Carcinoma of penis with metastatic nodes
 - Filariasis
 - Tubercular lymphadenopathy
- Hydrocele and edema in foot occur in:** (PGI Nov 2011)
 - W. bancrofti
 - B. malayi
 - B. timori
 - Oncocerca volulus
 - Guinea worm
- Chronic lymphedema of limb is predisposed to all of the following except:** (All India 2004)
 - Thickening of the skin
 - Recurrent soft tissue infections
 - Marjolin's ulcer
 - Sarcoma
- Lymphovenous anastomosis is done for:** (PGI Dec 97)
 - Filarial lymphedema
 - Lymphoid cyst
 - Cystic hygroma
 - Malignant lymphedema
- Commonest cause of unilateral pedal edema in India is:** (All India 90)
 - Filariasis
 - Post traumatic
 - Post irradiation
 - Milroy's disease
- All are true about congenital lymphedema except:** (Recent Question 2014; All India 91)
 - It is bilateral
 - Involve lower limb
 - Almost always manifests before puberty
 - Acute lymphangitis may occur
- The commonest cause for lymphedema of upper limb is:** (All India 91, 92)
 - Filariasis
 - Congenital
 - Neck surgery
 - Post mastectomy irradiation
- Milroy's disease is:** (JIPMER 92)
 - Edema due to filariasis
 - Post cellulitic lymphedema
 - Congenital lymphedema
 - Lymphedema following surgery
- Most common bacterial infection in lymphedema is:** (DNB 2010)
 - Staphylococcus
 - Streptococcus
 - E. coli
 - Pseudomonas
- Lymphangiography of the leg is performed by:**
 - An injection of sodium diatrizoate (Hypaque) subcutaneously between the toes
 - Injection sodium diatrizoate retrogradely under pressure into a small vein on the dorsum of the foot
 - Dissecting lymphatics through an incision on the dorsum of the foot
 - The use of an infusion pump
- Finding the cause of unilateral lymphedema of the leg includes:** (JIPMER 78, 79, PGI 85)
 - Taking a family history
 - Looking for chronic infection in the foot
 - Looking for early malignant disease of the testis
 - Looking for filariasis
 - Performing a Casoni's test
- Treatment of acute lymphangitis requires:** (JIPMER 81, AMC 84)
 - Antibiotic and rest
 - Immediate lymphangiography
 - Immediate multiple incisions
 - No special treatment

17. **Grade I lymphedema means:** (JIPMER 2000)
 a. Pitting edema upto the ankle
 b. Pitting edema upto the knee
 c. Non-pitting edema
 d. Edema disappearing after overnight rest
18. **Chronically lymphedematous limb is predisposed to all of the following except:** (All India 2004)
 a. Thickening of the skin
 b. Recurrent soft tissue infections
 c. Marjolin's ulcer
 d. Sarcoma

LYMPHOMA

19. **Popcorn type of Reed-Sternberg cell is seen in the following type of Hodgkin's lymphoma:** (COMEDK 2007)
 a. Lymphocyte rich
 b. Mixed cellularity
 c. Lymphocyte predominance
 d. Lymphocyte depletion
20. **Carcinoma in which surgery is rarely indicated:** (PGI Nov 2009)
 a. Osteosarcoma
 b. Wilm's tumor
 c. Neuroblastoma
 d. Rhabdomyosarcoma
 e. Hodgkin's lymphoma
21. **All are poor prognostic factor for Hodgkin's lymphoma except:** (PGI Nov 2011, Dec 2001)
 a. Young age
 b. Involvement of stomach
 c. Lymphocyte depletion
 d. Extranodal metastasis
 e. Large mediastinal mass
22. **Commonest presentation of Hodgkin's lymphoma is:** (All India 99)
 a. Painless enlargement of lymph node
 b. Pruritus
 c. Fever
 d. Leucocytosis
23. **The most common site of enlargement of the lymph nodes in Hodgkin's lymphoma is:** (All India 95)
 a. Mediastinal
 b. Axillary
 c. Cervical
 d. Abdominal
24. **Malignant cell in Hodgkin's lymphoma is:** (AIIMS 85)
 a. Reed Sternberg cell
 b. Lymphocytes
 c. Histocyte
 d. Reticulum cells
25. **Total dose of radiation in Hodgkin's disease is:** (JIPMER 95)
 a. 500-1000 rad
 b. 1000-2000 rad
 c. 3000-5000 rad
 d. 5000-7000 rad
26. **Diagnosis of Hodgkin's disease is confirmed by:** (PGI 97)
 a. CT scan
 b. Bone marrow biopsy
 c. Lymph node biopsy
 d. Lymphangiography

MISCELLANEOUS

27. **A 45 years old man presents with progressive cervical lymph nodes enlargement, since 3 months: most diagnostic investigation is:** (All India 2001, 91)
 a. X-ray soft tissue
 b. FNAC
 c. Lymph node biopsy
 d. None of the above
28. **True about lymphangioma:** (PGI June 2003)
 a. It is a malignant tumor
 b. It is a congenital sequestration of lymphatic channel
 c. Cystic hygroma is a lymphangioma
 d. Laser excision is done
 e. Sclerotherapy is common done
29. **True about lymphangioma is:**
 a. Common in puberty
 b. Respond in low doses to radiotherapy
 c. Lymphangioma progress slowly and may invade local tissue
 d. Predisposes to cancer
30. **The most common site of lymphangiosarcoma is:** (UPSC 2004)
 a. Liver
 b. Spleen
 c. Post-mastectomy edema of arm
 d. Retroperitoneum
31. **Lymphangiosarcoma occurs in:** (DNB 2010)
 a. Lymphangiomias
 b. Lymphomas
 c. Lymphedema
 d. Serosus cavity tumour
32. **Investigation of choice in detecting small para-aortic lymph node is:** (JIPMER 92)
 a. Ultra sound scan
 b. CT scan
 c. Lymphangiography
 d. Arteriography
33. **In HIV infection, diffuse lymphadenopathy in a person who is clinically well is usually a sign of which of the following?** (COMEDK 2004)
 a. Lymphoma
 b. Kaposi's sarcoma
 c. Tuberculosis
 d. Persistent generalized lymphadenopathy (PGL)
34. **Necrotizing lymphadenitis is characteristically seen in:** (All India 2011)
 a. Kimura disease
 b. Kikuchi disease
 c. Hodgkin's disease
 d. Castleman disease
35. **Lethal midline granuloma is synonym of:** (DNB 2007)
 a. Wagner's granulomatosis
 b. Extra nodal NK cell/T cell lymphoma nasal type
 c. Syphilis of nasal septum
 d. Tuberculosis of nasal septum

EXPLANATIONS

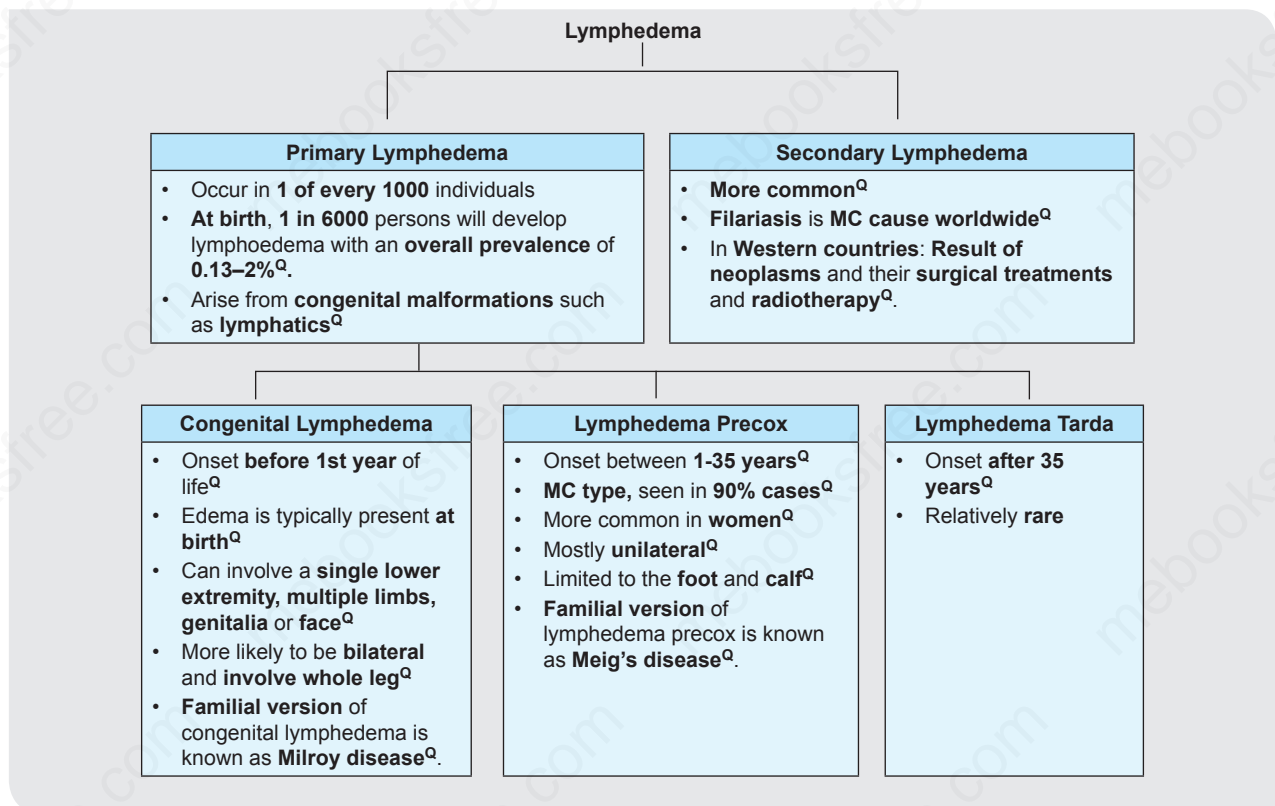
LYMPHEDEMA

1. Ans. a Lymphangiosarcoma may occur, b. Associated with Milroy's disease, e. Prevalence is 2%

(Ref: Sabiston 19/e p1820-1824; Schwartz 10/e p934-936, 1879-1880, 9/e p795-798; Bailey 26/e p928-930, 25/e p945-952)

Primary Lymphedema is uncommon, occurs in 1 of every 1000 individuals. At birth, 1 in 6000 persons will develop lymphoedema with an overall prevalence of 0.13–2%.

Lymphangiosarcoma is a rare tumor that develops as a complication of long standing (>10 years) lymphedema.

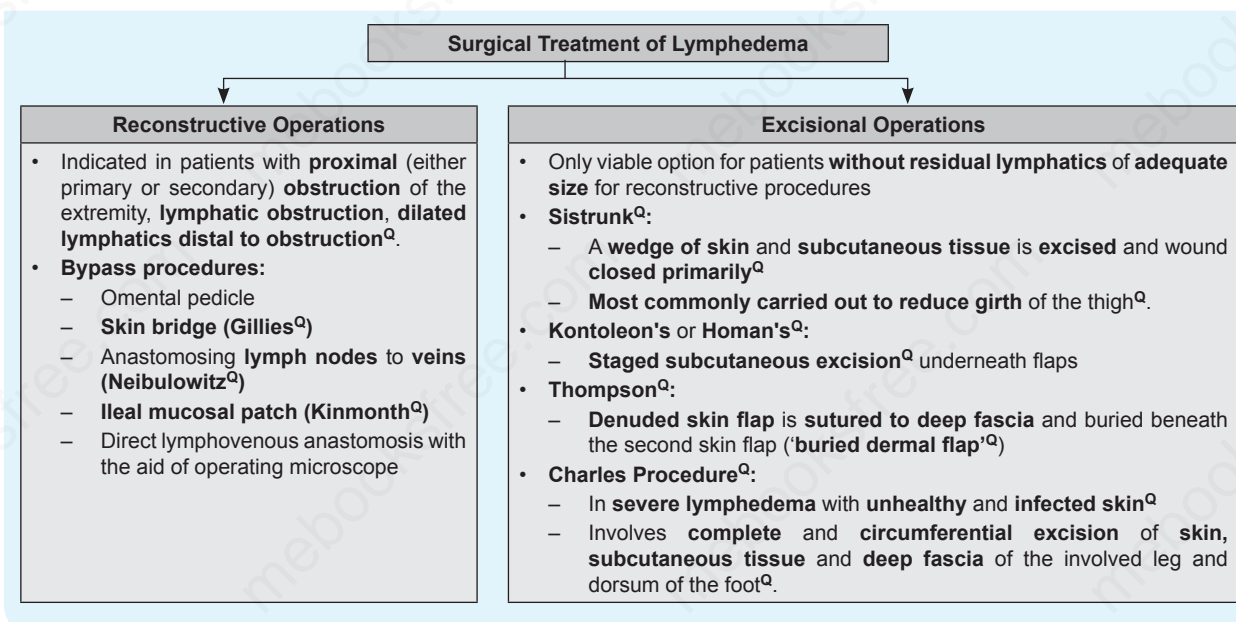


2. Ans. c. de Quervain's cross red operation

(Ref: Sabiston 19/e p1822-1824; Schwartz 10/e p934-936, 1879-1880, 9/e p797-798; Bailey 26/e p934-938, 25/e p954-958)

TREATMENT OF LYMPHOEDEMA

- Most (95%) of patients can be **managed non-operatively**^Q
- Mainstay of treatment is **nonsurgical measures**:
 - Use of **external compressive garments** and **devices**^Q
 - Limb elevation**^Q
 - Antibiotics** for episodes of **cellulitis**^Q
 - Specialized complex **physical therapy**^Q
- Efficacy of **surgical options** is **generally poor**, and these are **reserved for cases** in which aggressive nonsurgical measures have **failed**^Q.
- Surgical treatment** may be considered in cases of **severe functional impairment**, **recurrent lymphangitis** or **severe pain** despite medical therapy^Q.



3. Ans. b. Lymph node with vein anastomosis

4. Ans. b. Lymphedema precox

5. Ans. c. Filariasis

6. Ans. a. W. bancrofti; b. B. malayi; c. B. timori (Ref: Sabiston 19/e p1820-1824; Schwartz 10/e p934,1879; 9/e p796-798; Bailey 26/e p930-931, 25/e p950-952)

SECONDARY LYMPHEDEMA

- Secondary lymphedema is far more common than primary lymphedema^Q.
- Secondary lymphedema develops as a result of lymphatic obstruction or disruption^Q.
- Axillary node dissection leading to lymphedema of the arm is the most common cause of secondary lymphedema in the United States^Q.
- Other causes of secondary lymphedema include radiation therapy, trauma, infection, and malignancy^Q.
- Globally, filariasis (caused by *Wucheria bancrofti*, *Brugia malayi*, and *Brugia timori*) is the most common cause of secondary lymphedema^Q

FILARIASIS

- Filariasis: MC cause of lymphedema worldwide^Q
- Particularly prevalent in Africa, India and South America^Q (affecting 5-10% of the population)
- Viviparous nematode *Wucheria bancrofti*, whose only host is man^Q, is responsible for 90% of cases and is spread by the mosquito (*Culex*)^Q.
- Disease is associated with poor sanitation^Q.

Pathogenesis

- Parasite enters lymphatics from the blood and lodges in lymph nodes, where it causes fibrosis and obstruction, due partly to direct physical damage and partly to the immune response of the host^Q.
- Proximal lymphatics become grossly dilated with adult parasites^Q.
- The degree of edema is often massive elephantiasis^Q.

Clinical Features

- Acute: Fever, headache, malaise, inguinal and axillary lymphadenitis, lymphangitis, cellulitis, abscess formation and ulceration, funiculo-epididymo-orchitis^Q
- Chronic: Lymphedema of legs (arm, breast), hydrocele^Q, abdominal lymphatic varices, chyluria and lymphuria^Q.

Diagnosis

- Microfilariae enter the blood at night and can be identified on a blood smear, in a centrifuged specimen of urine or in lymph itself^Q.
- A complement fixation test^Q is also available and is positive in present or past infection. Eosinophilia is usually present.

Treatment

- Diethylcarbamazine destroys the parasites^Q but does not reverse the lymphatic changes.
- Once the infection has been cleared, treatment is as for primary lymphoedema.

7. Ans. c. Marjolin's ulcer (Ref: Sabiston 19/e p1820; Schwartz 10/e p934-936, 1879-1880, 9/e p797; Bailey 26/e p926-927, 25/e p947-948)

COMPLICATIONS OF LYMPHEDEMA

- **Limb swelling:** Cause discomfort and aching^Q
- **Infections:** Recurrent bacterial and fungal infections, recurrent cellulitis or lymphangitis leading to skin thickening^Q
- **Risk of malignancy:** Lymphangiosarcoma (Stewart-Treves' syndrome)^Q

Malignancies associated with lymphedema

- | | |
|--|--|
| <ul style="list-style-type: none"> • Lymphangiosarcoma^Q (Stewart-Treves' syndrome) • Kaposi's sarcoma (HIV) • Squamous cell carcinoma • Liposarcoma | <ul style="list-style-type: none"> • Malignant melanoma • Malignant fibrous histiocytoma • Basal cell carcinoma • Lymphoma |
|--|--|

Signs in Chronic Lymphedema

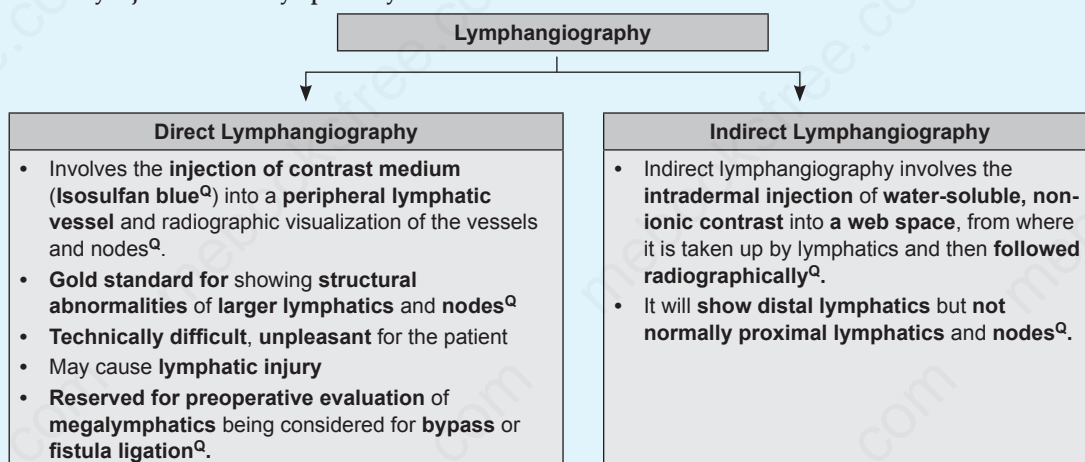
Buffalo hump^Q	• Contour of the ankle is lost through infilling of the submalleolar depressions, a 'buffalo hump' forms on the dorsum of the foot
Square toes^Q	• Toes appear 'square' because of confinement of footwear
Stemmer's sign^Q	• Skin on the dorsum of the toes cannot be pinched because of subcutaneous fibrosis

8. Ans. a. Filarial lymphedema
 9. Ans. a. Filariasis
 10. Ans. None
 11. Ans. a. Filariasis
 12. Ans. c. Congenital lymphedema
 13. Ans. b. Streptococcus

The most common complication of both primary and secondary lymphedema is erysipelas (Acute Streptococcus bacterial infection of the deep epidermis with lymphatic spread). Cellulites may occur concurrently in lymphedema because of pooling of protein rich lymph fluid makes it easier for the patient to develop an infection.

14. Ans. c. Dissecting lymphatics through an incision on the dorsum of the foot
 (Ref: Sabiston 19/e p1822; Schwartz 10/e p935, 9/e p797; Bailey 26/e p933, 25/e p954)

Direct-contrast lymphangiography provides the finest details of the lymphatic anatomy. However, it is an invasive study that involves exposure and cannulation of lymphatics at the dorsum of the forefoot, followed by slow injection of contrast medium (ethiodized oil). The procedure is tedious, the cannulation often necessitates aid of magnification optics (frequently an operating microscope is needed), and the dissection requires some form of anesthetic. After cannulation of a superficial lymph vessel, contrast material is slowly injected into the lymphatic system.



15. Ans. a. Taking a family history; b. Looking for chronic infection in the foot
 16. Ans. a. Antibiotic and rest

17. Ans. d. Edema disappearing after overnight rest (Ref: Sabiston 19/e p1821; Bailey 26/e p926, 25/e p947)

Brunner's Clinical Classification of Lymphedema	
Grade	Clinical features
Subclinical (latent)	Excess interstitial fluid and histological abnormalities in lymphatics and lymph nodes, no clinically apparent lymphedema ^Q
I	Pitting edema, largely or completely disappears on elevation and bed rest ^Q
II	Non-pitting edema, does not significantly reduce upon elevation ^Q
III	Edema associated with irreversible skin changes, i.e. fibrosis, papillae ^Q

18. Ans. c. Marjolin's ulcer

LYMPHOMA

19. Ans. c. Lymphocyte predominance (Ref: Harrison 18/e p933-935)

HODGKIN'S LYMPHOMA

- Classified into four types according to Rye's classification:
 - Nodular sclerosis (30-60%)^Q
 - Mixed cellularity (20-40%)
 - Lymphocyte predominance (<10%)
 - Lymphocyte depleted (<10%)

- Prognosis: Lymphocytic predominant^Q > Nodular sclerosis > Mixed cellularity > Lymphocyte depletion
- Nodular sclerosis is MC type all over the world^Q whereas mixed cellularity is MC in India^Q
- Nodular sclerosis is MC in females and mediastinal involvement^Q is particularly common.

Subtypes	Reed Sternberg cells variant
Nodular sclerosis	• Lacunar cells ^Q
Mixed cellularity	• Classic Reed Sternberg cells ^Q
Lymphocyte predominance	• Popcorn cell ^Q
Lymphocyte depleted	• Reticular variant ^Q (more cellular)

20. Ans. e. Hodgkin's lymphoma (Ref: Harrison 18/e p933-935)

- Treatment of Hodgkin's disease includes multiagent combination chemotherapy, either alone or with low dose radiation^Q.
- Osteosarcoma: Successful treatment of osteosarcoma requires multiagent chemotherapy with complete surgical resection.
- Wilm's Tumor: Immediate treatment is nephroureterectomy. Most of the times all the three modalities of treatment i.e. surgery, chemotherapy and radiotherapy may be required.
- Rhabdomyosarcoma: The optimal therapy of rhabdomyosarcoma involves multimodality approach, which includes chemotherapy, surgery and radiotherapy.
- Neuroblastoma: Three main modalities of treatment for neuroblastoma include chemotherapy, surgery and radiation.

21. Ans. a. Young age (Ref: Harrison 18th/933-935; Anderson Manual of Medical Oncology 2007/248-258)

ADVERSE PROGNOSTIC FACTORS FOR HODGKIN'S LYMPHOMA

- Advanced age^Q
- Mixed cellularity or lymphocyte^Q depletion histologic type^Q
- 'B' symptoms^Q
- Large number of involved nodal regions^Q
- Anemia^Q
- Male gender^Q
- Large mediastinal mass^Q
- Raised ESR^Q
- Low serum albumin^Q

22. Ans. a. Painless enlargement of lymph node (Ref: Harrison 18/e p933-935)

HODGKIN'S LYMPHOMA

- Most patients present with palpable lymphadenopathy that is non-tender^Q.
- In most patients, these lymph nodes are in the neck, supraclavicular area and axilla.
- More than half of the patients will have mediastinal adenopathy^Q at diagnosis and this is sometimes initial manifestation.
- Diagnosis is confirmed by LN biopsy^Q.

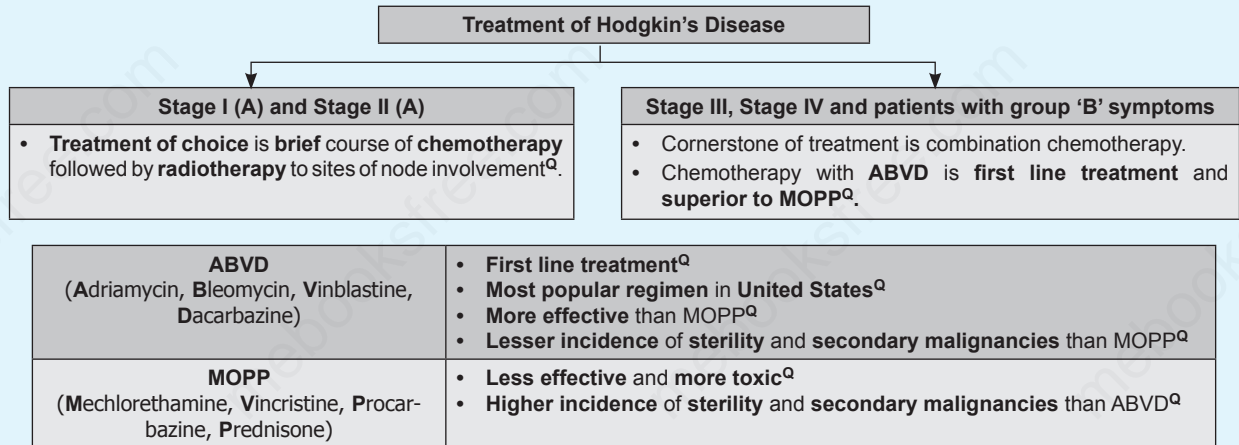
23. Ans. a. Mediastinal (Ref: Harrison 18/e p934)

- In about 50% of patients who have both Hodgkin's and Non-Hodgkin's lymphoma, the mediastinum may be the primary site^Q.

24. Ans. a. Reed Sternberg cell

25. Ans. c. 3000-5000 rad (Ref: Harrison 18/e p934-935)

Moderate doses of 30-40 Gray are usually quite sufficient to take care of localized Hodgkin's disease.



26. Ans. c. Lymph node biopsy

MISCELLANEOUS

27. Ans. c. Lymph node biopsy (Ref: Harrison 18th/467)

Harrison says "In cases of lymphadenopathy, if the patient history and physical findings are suggestive of malignancy, then a prompt lymph node biopsy should be done. FNAC is not of much use, as it does not provide enough tissue to reach a diagnosis."

28. Ans. b. It is a congenital sequestration of lymphatic channel; c. Cystic hygroma is a lymphangioma

(Ref: Sabiston 19/e p1825; Schwartz 10/e p575, 598, 1602-1603, 9/e p1667; Bailey 26/e p927, 25/e p947-948)

LYMPHANGIOMA

- Lymphangiomas are the lymphatic analogue of the hemangiomas of blood vessels.
- Divided into two types:
 - Simple or capillary lymphangioma
 - Cavernous lymphangioma or cystic hygroma

Clinical Features

- Most of these benign tumors are present at birth, and 90% of them can be identified by the end of the first year of life.^Q
- Site of cavernous lymphangiomas: Mainly in neck or axilla^Q (rarely in the retroperitoneum)
- Site of simple capillary lymphangiomas: Subcutaneously in the head and neck region and axilla.

- Represent isolated and sequestered segments of the lymphatic system^Q that retain the ability to produce lymph.
- As the volume of lymph inside the cystic tumor increases, they grow larger within the surrounding tissues.

Treatment

- Surgical excision^Q, taking care to preserve all normal surrounding infiltrated structures.

29. Ans. c. Lymphangioma progress slowly and may invade local tissue

30. Ans. c. Post-mastectomy edema of arm (Ref: Sabiston 19/e p1825; Schwartz 10/e p493, 776, 1468, 1470, 9/e p1285; Bailey 26/e p931, 25/e p845)

ANGIOSARCOMA (LYMPHANGIOSARCOMA)

- Rare tumor that develops as a complication of long-standing (>10 years) lymphoedema^Q.
- Stewart and Treves described lymphangiosarcoma of the upper extremity in women with ipsilateral lymphedema after radical mastectomy. (Stewart-Treves Syndrome)^Q

Clinical Features

- Acute worsening of edema^Q
- Appearance of sub-cutaneous nodules with propensity towards hemorrhage and ulceration^Q

Treatment

- Pre-operative **chemotherapy** and **radiotherapy** followed by **surgical excision (radical amputation)**^Q
- Associated with **poor prognosis**.

31. Ans. c. Lymphedema

32. Ans. b. CT scan (Ref: Sutton 7/e p515)

- Investigation of choice in detecting small para-aortic lymph node: CT scan^Q

33. Ans. d. Persistent generalized lymphadenopathy (PGL) (Ref: Harrison 18/e p466, 1525)

PERSISTENT GENERALIZED LYMPHADENOPATHY (PGL)

- HIV patients develop PGL as an **early clinical manifestation** of HIV infection^Q.
- PGL is defined as presence of **>1 LN** in **two or three extra-inguinal sites** for **>3 months** without an obvious cause^Q.
- Enlargement is due to **follicular hyperplasia**^Q.

34. Ans. b. Kikuchi disease (Ref: Nelson 18/e p2094)

KIKUCHI DISEASE

- Rare **subacute necrotizing lymphadenitis**^Q
- Most commonly seen in **children** and **young adults** of **Asian heritage**^Q
- Etiology is **unknown**

Pathology

- **Necrotizing** and **crescentic plasmacytoid monocytes**^Q
- Absence of neutrophils and eosinophils

Clinical Features

- **Most characteristic feature: Painful tender lymphadenopathy**^Q, most commonly involving **cervical LN**
- Less commonly involved LNs include axillary and inguinal LNs
- Deep LNs and extranodal sites are rarely involved
- **Lymphadenopathy** is associated with **fever** and **systemic signs**

Prognosis

- **Self-limiting disease**, resolves **spontaneously** within **6 months**^Q

35. Ans. b. Extra nodal NK cell/T cell lymphoma nasal type

Thorax and Lung

MULTIPLE CHOICE QUESTIONS

MEDIASTINAL TUMORS

1. Middle mediastinal masses include all the following except: (COMEDK 2004)
 - a. Bronchogenic cyst
 - b. Ascending aortic aneurysm
 - c. Pericardial cyst
 - d. Ganglioneuroma
2. Middle mediastinal masses include all the following except: (COMEDK 2005)
 - a. Bronchogenic cyst
 - b. Lymphoma
 - c. Pericardial cyst
 - d. Ganglioneuroma
3. Following are the tumors of posterior mediastinum except: (COMEDK 2006)
 - a. Neuroblastoma
 - b. Ganglioneuroma
 - c. Paravertebral abscess
 - d. Thymic tumor
4. The commonest anterior mediastinal tumors is: (WBPG 2015, Recent Question 2015, COMEDK 2008)
 - a. Aneurysm of descending aorta
 - b. Neurogenic tumour
 - c. Thymoma
 - d. Bronchogenic cyst
5. Common tumor of posterior mediastinum are: (PGI Nov 2009)
 - a. Lymphoma
 - b. Neuroblastoma
 - c. Neurogenic tumors
 - d. Thymoma
 - e. Bronchogenic cyst
6. D/D of anterior mediastinal mass includes: (PGI May 2011)
 - a. Teratoma
 - b. Thymoma
 - c. Lymphoma
 - d. Neurogenic tumor
 - e. Parathyroid carcinoma
7. Lymphoma most commonly affects which compartment of the mediastinum? (MHPGMCET 2006)
 - a. Anterior
 - b. Middle
 - c. Posterior
 - d. Inferior
8. The most common mediastinal tumor: (MHCET 2016, MHSSMCET 2008)
 - a. Thymoma
 - b. Lymphoma
 - c. Neurofibroma
 - d. Bronchogenic cyst
9. In thymoma, all are seen except: (AIIMS June 2001)
 - a. Hypogammaglobulinemia
 - b. Hyperalbuminemia
 - c. Red cell aplasia
 - d. Myasthenia gravis

10. Not a posterior mediastinal tumor: (AIIMS Nov 98)
 - a. Neurofibroma
 - b. Lymphoma
 - c. Thymoma
 - d. Gastroenteric cyst
11. Posterior mediastinal tumors: (PGI June 2003)
 - a. Neuroblastoma
 - b. Bronchogenic cyst
 - c. Neuroenteric cyst
 - d. Lymphoma
 - e. Anterior thoracic meningioma
12. Majority of lung cysts occur in: (AIIMS Nov 94)
 - a. Mediastinum
 - b. Near carina
 - c. Base of the lung
 - d. Peribronchial tissue
13. Which tumor among the following is not found in anterior mediastinum? (AIIMS Nov 95)
 - a. Retrosternal goitre
 - b. Thymoma
 - c. Teratomatous mass
 - d. Neurogenic tumour
14. Most common tumor in the posterior mediastinum is: (DNB 2005, 2000, All India 2008, DPG 2008)
 - a. Neurofibroma
 - b. Teratoma
 - c. Lymphoma
 - d. Bronchogenic cyst
15. Commonest posterior mediastinal tumour is: (UPSC 85, AIIMS 87, Kerala 87)
 - a. Lung cyst
 - b. Neurofibroma
 - c. Dermoid
 - d. Thyroid
 - e. Thymic tumour
16. Thymectomy causes: (TN 98)
 - a. Failure of rejection of transplanted organs
 - b. Myasthenia gravis
 - c. Autoimmune disorders
 - d. None of the above
17. The most common primary tumor of mediastinum:
 - a. Lymphoma
 - b. Teratoma
 - c. Neurogenic tumor
 - d. Thymoma
18. Tumors of anterior mediastinum include the following except: (Kerala PG 2015, UPSC 2007)
 - a. Thymoma
 - b. Lymphoma
 - c. Germ cell tumour
 - d. Schwannoma

PLEURAL EFFUSION

19. Most common site for putting chest drain in case of pleural effusion: (Bihar PG 2014, AIIMS June 2000, All India 2002)
 - a. 2nd intercostal space mid-clavicular line
 - b. 7th intercostal space mid-axillary line
 - c. 5th intercostal space mid clavicular line
 - d. 5th intercostal space just lateral to vertebral column

20. Meig's syndrome consist of the following except:

(Karnataka 94)

- a. Ascites
- b. Hydrothorax
- c. Benign ovarian tumor
- d. Malignant ovarian tumor

21. Pseudochyolous pleural effusion is most often seen in:

(AIIMS 78, PGI 81)

- a. T.B.
- b. Lymphoma
- c. CA lung
- d. Filariasis

22. A rapidly filling hemorrhagic pleural effusion is suggestive of:

(COMEDK 2004)

- a. Pneumococcal infection
- b. Tuberculosis
- c. Bronchiectasis
- d. Bronchogenic carcinoma

PNEUMOTHORAX

23. Spontaneous pneumothorax is commonly seen in:

(PGI June 2002)

- a. Smokers
- b. Young females
- c. Old age
- d. Short statured men

24. Which of the following is a cause of unilateral hyperluciscent lung on chest radiography?

(COMEDK 2009)

- a. Poland syndrome
- b. Asthma
- c. Acute bronchiolitis
- d. Pleural effusion

25. Pneumothorax of what size generally needs operative treatment?

(MHSSMCET 2010)

- a. >10%
- b. >20%
- c. >30%
- d. >40%

26. In a patient with one episode of spontaneous pneumothorax, which is advised?

(Jharkhand 2003)

- a. Stop diving
- b. Stop smoking
- c. Stop flying
- d. All

27. For open pneumothorax, which of the following is treatment of choice?

(AIIMS June 97)

- a. IPPV
- b. ICD with underwater seal
- c. Thoracostomy and close the rent
- d. Wait and watch

28. A case of spontaneous pneumothorax comes to you. What will be earliest treatment of choice?

(AIIMS June 97)

- a. IPPV
- b. Needle aspiration
- c. ICD
- d. Wait and watch

29. Spontaneous pneumothorax exceeding % of chest cavity should have a chest tube inserted:

(AIIMS 84)

- a. 10
- b. 25
- c. 45
- d. 60

30. In pneumothorax due to blunt injury, treatment of choice is:

(AIIMS 92)

- a. Observation
- b. Pneumonectomy
- c. Thoracotomy
- d. Intercostal drainage

31. A patient presents with sudden onset of breath lessness after subclavian vein cannulation. On examination, breath sounds are absent while the chest is hyper-resonant on percussion on one side. Most likely cause is:

(All India 2012)

- a. Iatrogenic pneumothorax
- b. Subclavian vein air embolus
- c. Malposition of cannula
- d. Cardiac arrhythmia

32. While inserting a central venous catheter, a patient develops respiratory distress. The most likely cause is:

(Bihar PG 2014, All India 2002)

- a. Hemothorax
- b. Pneumothorax
- c. Pleural effusion
- d. Hypovolemia

33. All of the following are characteristic features of primary spontaneous pneumothorax except:

(AIIMS 92)

- a. Male gender
- b. Old age
- c. Tall stature
- d. History smoking

34. Spontaneous pneumothorax is commonly seen in:

(PGI June 2002)

- a. Smokers
- b. Young females
- c. Old age
- d. Short statured men

35. Which of the following statements about pneumothorax is true?

(AIIMS Dec 94)

- a. Breath sounds are increased
- b. Percussion note is decreased
- c. Always needs chest tube insertion
- d. Often needs chest tube insertion

36. In left sided massive pneumothorax, ECG shows all except:

(AIIMS 94)

- a. Left axis deviation
- b. Absent R wave
- c. Peaked P wave
- d. Precordial T wave inversion

37. Intrapleural pressure greater than atmospheric pressure is diagnostic of:

(MHPPMCET 2001)

- a. Valvular pneumothorax
- b. Closed pneumothorax
- c. Open pneumothorax
- d. All

TENSION PNEUMOTHORAX

38. A 30-years old female comes acute breathlessness, neck vein distention, and absent breath sounds and mediastinal shift. Which of the following should be done immediately?

(PGI June 2008)

- a. HRCT is the investigation of choice
- b. ABG analysis should be done
- c. CXR
- d. Large bore needle puncture of pleura

39. Tension pneumothorax due to fracture rib is treated by:

(DPG 2011, PGI 96)

- a. Strapping
- b. Tube drainage
- c. IPPV
- d. Internal fixation with open reduction

40. Treatment of choice for tension pneumothorax is:

(SGPGI 2005)

- a. Immediate IC tube drainage
- b. Continuous aspiration by needle
- c. Intermittent aspiration by needle
- d. Thoracotomy with repair of leakage

41. True regarding management of traumatic pneumothorax is

(SGPGI 2005)

- a. Immediate ICD tube insertion
- b. CT-scan should be done to confirm pulmonary leak
- c. Intermittent needle aspiration
- d. Sealed

42. A patient after road traffic accident presented with tension pneumothorax. What is the first line of management?

(AIIMS Nov 2013)

- a. Insert wide bore needle in 2nd intercostal space
- b. Immediate chest X-ray
- c. CT scan
- d. Emergency thoracotomy

43. Condition which builds within hemithorax resulting in collapsed lung, flattened diaphragm, contralateral mediastinal shift and compromised venous return to right side of heart is known as:

(MCI Sept 2007)

- a. Open pneumothorax
- b. Flail chest
- c. Massive pulmonary hemorrhage
- d. Tension pneumothorax

44. Lung injury with bad prognosis is: (DNB 2009)
 a. Open pneumothorax b. Closed pneumothorax
 c. Tension pneumothorax d. All have same prognosis

45. What is the 1st thing to be done to a patient with tension pneumothorax? (UPPG 96)
 a. Insertion of wide bore needle in the inter costal space
 b. Water seal drainage
 c. Leave the patient at rest for air to be absorbed
 d. None

46. Tensions pneumothorax results in: (ICS 98)
 a. Alkalosis b. Increased cardiac output
 c. Decreased venous return d. All of the above

47. What is the emergent management of tension pneumothorax? (AIIMS November 2014)
 a. Chest X-ray
 b. Emergency room thoracotomy in unstable patients
 c. Insert needle in 2nd intercostal space
 d. Tube thoracostomy in 5th intercostal space

HEMOTHORAX

48. Decision regarding surgery in a case of hemothorax due to blunt trauma chest should be based on: (All India 2008)
 a. Chest symptoms b. Hemodynamic status
 c. Nature of chest tube output d. X-ray finding
49. The ideal treatment for hemothorax of blood loss greater than 500 ml/hour: (PGI June 99)
 a. Wait and watch
 b. Needle aspiration
 c. Intercostal tube
 d. Open thoracotomy with ligation of vessel
50. About hemothorax: (PGI Dec 2002)
 a. Seen in choriocarcinoma
 b. Supine posture is better than erect posture
 c. Needle aspiration may be needed for diagnosis
 d. Thoracotomy is always done
51. Excessive bleeding during hemothorax is caused usually by: (AIIMS June 94)
 a. Vena cava b. Internal mammary artery
 c. Heart d. Major artery

LUNG ABSCESS

52. A 80-years old male presented with lung abscess in left upper zone. Best treatment modality is: (UPPG 2008)
 a. Antibiotics according to organisms
 b. Surgical drainage
 c. Tube thoracostomy
 d. Wait and Watch
53. Management of a lung abscess refractory to prolonged antibiotic treatment includes all of the following except: (COMEDK 2004)
 a. Lobectomy
 b. Open drainage
 c. Tube drainage
 d. Intracavitary antibiotic instillation
54. Complication of empyema are all except: (PGI Dec 99)
 a. Empyema necessitans
 b. Bronchopleural fistula
 c. Osteomyelitis
 d. Pneumonia

55. Commonest cause of lung abscess: (AIIMS Nov 96)
 a. Aspiration
 b. Hematogenous spread from distant site
 c. Direct contact
 d. Lymphatic spread

56. Least common site of lung abscess is: (PGI June 99)
 a. Left upper lobe b. Left lower lobe
 c. Right upper lobe d. Right lower lobe

57. Most common cause of amoebic lung abscess is: (AIIMS Nov 94)
 a. Direct extension from liver b. Hematogenous spread
 c. Lymphatic spread d. By inhalation

58. Failure of adequate drainage in an empyema with a bronchopleural fistula is indicated by: (JIPMER 81, AMC 85)
 a. Drainage less than 100 cc per day
 b. Hemorrhagic drainage less than 100 cc per day
 c. The development of haemoptysis
 d. Continued productive cough with purulent material
 e. All of the above

59. Most common cause of cold abscess of chest wall is: (TN 95)
 a. Pott's spine b. TB abscesses of chest wall
 c. TB of ribs d. Intercostal lymphadenitis

60. Empyema necessitans is defined as so when: (UPSC 2002)
 a. Plural empyema is under pressure
 b. Pleural empyema has ruptured into bronchus
 c. Pleural empyema has ruptured into the pericardium
 d. Pleural empyema is showing extension to the subcutaneous tissue

61. Empyema can be caused by the following parasites except: (MHSSMCET 2008)
 a. E. granulosus b. Entamoeba coli
 c. Paragonimus westermani d. Strongyloides stercoralis

PLEURAL COLLECTIONS

62. True about chylothorax: (DPG 2007)
 a. Left side more common
 b. Clear fluid
 c. Immediate thoracotomy should be done
 d. TOC is excision and ligation of thoracic duct
63. Chyluria is caused by all except: (MCI Sept 2009)
 a. Pregnancy b. Childbirth
 c. Filariasis d. Bile duct stones

SEQUESTRATION OF LUNGS

64. Intralobar sequestration of lungs takes its blood supply from: (Recent Question 2014, AIIMS Nov 94)
 a. Internal mammary artery
 b. Descending abdominal aorta
 c. Pulmonary artery
 d. None of the above
65. Lung sequestration occurs most commonly seen in which lobe? (AIIMS June 93)
 a. Apical b. Left posterior basal
 c. Left porterosuperior d. Right lateral basal
66. All of the following statements regarding bronchial cysts are true except: (MAHE 2005)
 a. Seen in mediastinum b. 50-70% occur in lung
 c. Are commonly infected d. Multilocular
67. True about bronchogenic cyst: (Punjab 2007)
 a. Most of them are located at base of lung
 b. They arise from anomalous development of foregut
 c. They usually communicate with lung
 d. They are lined by pseudostratified epithelium

68. **Intralobar sequestration of lung is commonest in the:**
 a. Apical segment of upper lobe (JIPMER 81, UPSC 89)
 b. Medial segment of middle lobe
 c. Lateral basal segment of lower lobe
 d. Posterior basal segment of lower lobe
69. **Extralobar bronchogenic cysts may communicate with the following except:** (JIPMER 80, AMU 89)
 a. Esophagus b. Stomach
 c. Bronchus d. None of the above
70. **Sequestered lung is supplied most commonly by:** (Kerala 98)
 a. Bronchial arteries b. Descending aorta
 c. Subclavian artery d. Intercostal arteries
71. **Diagnosis of lung sequestration by:** (JIPMER 2000)
 a. CT b. Angiography
 c. MRI d. X-ray

TRACHEOBRONCHIAL FOREIGN BODY

72. **In erect posture, commonest site of foreign body in bronchus:** (AIIMS June 99)
 a. Right posterior basal b. Right anterior basal
 c. Lateral basal d. Medial basal
73. **Foreign body aspiration in supine position causes which of the following parts of the lung commonly to be affected?**
 a. Apical left lobe (Recent Question 2014, AIIMS June 2002)
 b. Apical lobe of right lung
 c. Apical part of the lower lobe
 d. Posterobasal segment of left lung
74. **A foreign body completely obstructing the right main bronchus causes:** (PGI June 99)
 a. Decreased ventilation perfusion ratio
 b. Increased ventilation in left lung
 c. Perfusion doubles in right lung
 d. Increased VP ratio in right lung

VATS

75. **In Video assisted thoracoscopic surgery for better vision, the space in the operative field is created by:** (AIIMS June 2002)
 a. Self retaining retractor
 b. CO₂ insufflations
 c. Collapse of ipsilateral lung
 d. Rib spacing
76. **VATS refers to:** (Orissa 2011)
 a. Vacuum assisted thoracic surgery
 b. Video assisted thoracoscopic surgery
 c. Video assisted transplant surgery
 d. None of the above

THORACOTOMY

77. **The following are indications for performing thoracotomy after blunt injury of the chest, except:** (UPSC 2008)
 a. 1000 ml drainage after placing an intercostal tube
 b. Continuous bleeding through intercostal tube of more than 200 ml/hour for three or more hours
 c. Cardiac tamponade
 d. Rib fracture
78. **Thoracotomy is indicated in all the following except:** (MHPGMCET 2003)
 a. Penetrating chest injuries
 b. Rapidly accumulating hemothorax
 c. Massive air leak
 d. Pulmonary contusion

79. **Surgical indication in the treatment of hemoptysis:** (PGI Dec 2006)
 a. Profuse uncontrolled bleeding
 b. Bronchiectasis
 c. Bronchial adenoma
 d. Bronchial fistula
80. **Muscle not cut in posterolateral thoracotomy is:** (PGI Dec 98)
 a. Serratus anterior b. Latissimus dorsi
 c. Rhomboides major d. Pectoralis major
81. **Which is not an indication of thoracotomy?** (AIIMS Nov 98)
 a. Massive pneumothorax
 b. Pulmonary contusion
 c. Bleeding more than 200 ml/hour in thoracotomy tube
 d. Esophageal rupture
82. **During emergency thoracotomy, the incision is made > 1 cm lateral to sternal margin to preserve:** (All India 2012)
 a. Intercostal artery b. Superior epigastric artery
 c. Internal mammary artery d. Intercostal vein
83. **Emergency thoracotomy is indicated following chest trauma in the following conditions except:** (APPG 2016)
 a. Scapular and sternal fractures
 b. Esophageal perforation
 c. Penetrating injury with cardiac tamponade
 d. Massive hemothorax

BENIGN LUNG TUMORS

84. **The most common benign tumor of the lung is:** (COMEDK 2008)
 a. Hamartoma b. Alveolar adenoma
 c. Teratoma d. Fibroma
85. **Most common symptom of bronchial adenoma is:** (All India 96)
 a. Chest pain b. Cough
 c. Recurrent hemoptysis d. Weight loss
86. **True about bronchial adenoma:** (All India 98)
 a. 10-15% of all lung tumour b. Mostly malignant
 c. Recurrent hemoptysis d. Peripherally located
87. **The following is true about bronchial carcinoids:** (JIPMER 2011)
 a. Highly radiosensitive
 b. Metastasis common
 c. Carcinoid syndrome does not manifest
 d. Commonly arises from terminal bronchioles
88. **Blood stained sputum may be the only symptom in:** (Kerala 90)
 a. Bronchiectasis
 b. Carcinoma bronchus
 c. Adenoma bronchus
 d. Pulmonary T.b.

MESOTHELIOMA

89. **All are true regarding mesothelioma except?** (AIIMS May 2011)
 a. Bilaterally symmetrical
 b. Associated with asbestos exposure
 c. Histopathology shows biphasic pattern
 d. Occurs in late middle age
90. **Pleural mesothelioma is associated with:** (PGI Dec 2005)
 a. Asbestosis b. Berylliosis
 c. Silicosis d. Baggasosis
91. **In a patient of mesothelioma, one often finds:** (PGI 79, 80, AIIMS 84)
 a. Hypoglycemia
 b. An association with asbestosis
 c. Hemorrhagic pleural effusion
 d. Clubbing of fingers
 e. All of the above

SQUAMOUS CELL CARCINOMA

92. Cavity formation in bronchogenic carcinoma occurs in: (AIIMS 89)
- Oat cell carcinoma
 - Squamous cell carcinoma
 - Adenocarcinoma
 - Bronchoalveolar

ADENOCARCINOMA

93. True statement about adenocarcinoma lung are: (PGI June 2005)
- Common in females
 - Not associated with smoking
 - Central cavitation is a characteristic feature
 - Peripheral involvement is common
 - Upper lobe involvement is common
94. A patient presented with 1cm coin lesion over right upper lobe of lung on X-ray not suggestive of metastasis. FNAC revealed adenocarcinoma, no lymphadenopathy. Treatment is: (JIPMER 2010)
- Surgery
 - Surgery + chemotherapy
 - Surgery + Radiotherapy
 - Surgery + chemoradio therapy
95. What is true regarding adenocarcinoma lung? (AIIMS Dec 94)
- Causes 50% of lung cancers
 - Unlikely histological variant in young patients
 - Associated with subcutaneous angiomatoid lipoma
 - Peripheral location
96. Commonest type of lung carcinoma in nonsmokers is: (Kerala PG 2015, AIIMS Dec 94)
- Squamous cell carcinoma
 - Adenocarcinoma
 - Alveolar cell carcinoma
 - Small cell carcinoma
97. Lung to lung metastasis is seen in:
- Adenocarcinoma of lung
 - Squamous cell carcinoma
 - Small cell carcinoma
 - Neuroendocrine tumor of lung

SMALL CELL CARCINOMA

98. Which of the following statements about small cell carcinoma is true? (All India 2009)
- Bone metastasis is uncommon
 - Peripheral in location
 - Chemosensitive tumor
 - Paraneoplastic syndrome with PTH is common
99. Poorest prognosis in lung cancer is associated with: (COMEDK 2005)
- Small cell carcinoma
 - Adenocarcinoma
 - Squamous cell carcinoma
 - Adenosquamous cancer
100. Marker of small cell cancer of lung is: (DNB 2011)
- Synaptobrevin
 - Chromogranin
 - Cytokeratin
 - Vimentin
101. All are elaborated by small cell carcinoma lung, except:
- ADH
 - ACTH
 - 5-HT
 - Noradrenaline
102. The lung tumour responding best to radiotherapy: (UPPG 96)
- Small cell anaplastic
 - Squamous cell carcinoma
 - Adenocarcinoma
 - All respond equally well
103. In small cell carcinoma of the lung, one of the following is not seen: (Kerala 97)
- Hypercalcemia
 - Hyponatremia
 - Watery diarrhea
 - Hypokalemia

104. All of the following statements about small cell carcinomas are true, except: (PGI June 2006)

- Commonest malignancy of lung
- Associated with paraneoplastic syndrome
- Cause SVC obstruction
- Chemosensitive
- Commonly metastasizes to brain

105. Which of the following statements about small cell carcinoma is true? (All India 2009)

- Bone metastasis is uncommon
- Peripheral in location
- Chemosensitive tumor
- Paraneoplastic syndrome with increase PTH is common

106. In a chronic smoker, a highly malignant aggressive and metastatic lung carcinoma is: (AIIMS May 2001)

- Squamous cell carcinoma
- Small cell carcinoma
- Adenocarcinoma
- Large cell carcinoma

107. Following hormonal levels are increased in small cell carcinoma of lung except: (All India 97)

- ACTH
- Growth hormone
- ANF
- AVP

108. Carcinoma lung responding best to chemotherapy:

- Squamous cell carcinoma
- Oat cell type
- Adenocarcinoma
- All respond equally

109. Clubbing is least common in: (AIIMS Dec 97)

- Squamous cell carcinoma
- Adenocarcinoma
- Small cell carcinoma of lung
- Mesothelioma

110. Most cases of paraneoplastic syndrome are associated with which type of lung carcinoma: (JIPMER 2013)

- Small cell carcinoma
- Bronchogenic carcinoma
- Bronchoalveolar carcinoma
- Adenocarcinoma

CARCINOMA LUNG

111. Which of the following statements about lung carcinoma is true? (All India 2010)

- Squamous cell variant accounts for 70% of all lung cancers
- Oat cell variant typically present with cavitation
- Oat cell variant is typically associated with hilar adenopathy
- Adenocarcinoma variant is typically central in location

112. All of the following statements about non-small cell carcinoma of lung (NSCCL) are true except: (All India 2012)

- Contralateral mediastinal nodes are contraindication to surgical resection
- Single agent chemotherapy is preferred for patients >70 years with advanced disease
- Squamous cell carcinoma is the most common NSCCL among Asian population
- Geftinib is most effective for female smokers with adenocarcinoma histology

113. Ramesh, 40-years male patient presenting with polyuria, pain abdomen, nausea, vomiting, altered sensorium was found to have bronchogenic carcinoma. The electrolyte abnormality seen in him would be: (AIIMS May 2002)

- Hypokalemia
- Hyperkalemia
- Hypocalcaemia
- Hypercalcemia

114. A 60-years old male presented to the emergency with breathlessness, facial swelling and dilated veins on the chest wall. The most common cause is: (All India 2003)
- Thymoma
 - Lung cancer
 - Hodgkin's lymphoma
 - Superior vena caval obstruction
115. Which of the following tumor is most commonly associated with superior vena cava syndrome? (All India 2011)
- Lymphoma
 - Small cell carcinoma
 - Non small cell carcinoma
 - Metastasis
116. In a 56-years old chronic smoker there was a mass in bronchus which is successfully resected. This mass is most likely to be positive for: (AIIMS Nov 2009)
- Cytokeratin
 - Vimentin
 - Epithelial membrane cadherin
 - Leukocyte
117. A 60-year-old male presents to the clinic with complaints of abdominal pain, constipation and pain radiating to the groin over a week duration. He has 25-pack year smoking history and is currently being evaluated for a hilar mass picked up on chest radiography. As part of this laboratory work-up, the serum calcium was found to be elevated. The elevated serum calcium level is most likely linked to: (COMEDK 2014)
- Parathyroid adenoma
 - Parathyroid hyperplasia
 - Vitamin D intoxication
 - Secretion of PTH-related peptide
118. Which of the following has no infectious etiology? (AIIMS Nov 2009)
- Nasopharyngeal carcinoma
 - Hepatocellular carcinoma
 - Non-small cell lung carcinoma
 - Gastric carcinoma
119. Most common site of metastasis in lung carcinoma:
- Liver
 - Adrenal (AIIMS May 2007)
 - Bone
 - Brain
120. True about lung carcinoma: (PGI June 2009)
- Adenocarcinoma most common
 - Squamous cell carcinoma is most common
 - Originates for type-II pneumocytes
 - Oat cell (Neuroendocrine cells)
 - Squamous cell carcinoma peripherally located
121. Histological variants of bronchoalveolar carcinoma includes: (PGI Nov 2011)
- Clara cells
 - Adenosquamous
 - Mucin secreting cells
 - Type II pneumocytes
 - Neuroendocrine cell
122. Superior sulcus tumor of the lungs characteristically present with: (JIPMER 2011)
- Horner syndrome
 - Breathlessness
 - Hemoptysis
 - Pancoast syndrome
123. Superior vena cava syndrome is caused most commonly by: (MCI Sept 2009, AIIMS Nov 95)
- Adenocarcinoma
 - Squamous cell carcinoma
 - Small cell carcinoma
 - Large cell carcinoma
124. A 60-years old male was diagnosed as carcinoma right lung. On CECT chest there was tumour of 5 × 5 cm in upper lobe and another 2 × 2 cm size tumour nodule in middle lobe. The primary modality of treatment is: (DPG 2010, All India 2004)
- Radiotherapy
 - Chemotherapy
 - Surgery
 - Supportive treatment
125. A 65-years old miner has lost 7 kg weight within two months, has presented with cough, and blood streaked sputum. He was treated for pulmonary tuberculosis 10 years ago. He also has drooping of his left eyelid for one month. On physical examination, there is ptosis of the left eye and papillary miosis. Chest X-ray revealed round opacification in the left upper apical lobe. What is the most probable diagnosis? (AIIMS May 2006)
- Secondary tuberculosis
 - Adenocarcinoma
 - Squamous cell carcinoma
 - Asbestosis
126. Hoarseness secondary to bronchogenic carcinoma is usually due to extension of the tumor into: (UPSC 2002)
- Vocal cord
 - Superior laryngeal nerve
 - Left recurrent laryngeal nerve
 - Right vagus nerve
127. All seen in pancoast syndrome except: (HPU 2005)
- Brachial plexus involvement
 - Dyspnoea
 - Clubbing
 - Myasthenia gravis
128. Most common site of metastasis of carcinoma bronchi:
- Liver + Bones
 - Prostate (HPU 2005)
 - Kidney
 - Breast
129. Clinical manifestations of bronchogenic carcinoma include of the following except: (ICS 2005)
- Hoarseness of voice due to involvement of left recurrent laryngeal nerve
 - Horner's syndrome
 - Diaphragmatic palsy due to infiltration of phrenic nerve
 - Gastroparesis due to vagal involvement
130. The site of temporal bone metastasis is most commonly seen with: (UPPG 2010)
- Carcinoma breast
 - Carcinoma bronchus
 - Carcinoma kidney
 - Carcinoma prostate
131. Carcinoma responding maximally to radiotherapy is: (MCI Sept 2006)
- Squamous cell carcinoma
 - Adenocarcinoma
 - Small cell carcinoma
 - Large cell carcinoma
132. Most common type of carcinoma lung is: (AIIMS May 93)
- Small cell carcinoma
 - Adenocarcinoma
 - Squamous cell carcinoma
 - Large cell carcinoma
133. All of the following are true regarding oat cell carcinoma of lung, except (AIIMS June 99)
- Variant of large cell anaplastic carcinoma
 - Chemotherapy is effective
 - Paraneoplastic syndrome may be present
 - Causes SIADH
134. In pancoast tumor, following is seen except: (PGI June 98)
- Horner's syndrome
 - Rib erosion
 - Hemoptysis
 - Pain in shoulder and arm
135. In case of CA lung, which among the following will be contraindication for surgical resection? (AIIMS Nov 2000)
- Malignant pleural effusion
 - Hilar lymphadenopathy
 - Consolidation of one lobe
 - Involvement of visceral pleura
136. A 50-years old smoker male presents with pain along the left arm and ptosis. His chest radiograph shows a soft tissue opacity at the left lung apex with destruction of adjacent ribs. The picture is suggestive: (AIIMS Nov 2003)
- Adenocarcinoma lung
 - Bronchial carcinoid
 - Pancoast tumour
 - Bronchoalveolar carcinoma

137. Commonest symptom of carcinoma bronchus is:

(AP 84, Kerala 87)

- a. Hemoptysis
- b. Dyspnoea
- c. Cough
- d. Wheezing
- e. Pain

138. The first step when doing a pneumonectomy for cancer of the bronchus is to:

(UPPG 97)

- a. Ligate the pulmonary vein
- b. Ligate pulmonary artery
- c. Divide the bronchus
- d. Perform lymph node clearance

139. A 60-years old man presents with non productive cough and haemoptysis for 4 weeks; He has grade III clubbing, and a lesion in the apical lobe on X-ray most likely diagnosis here is:

(All India 2001, AIIMS June 2000)

- a. Small cell carcinoma
- b. Non-small cell carcinoma
- c. Fungal infection
- d. Tuberculosis

140. A patient presents with secondaries to the adrenals. The most common site of primary is:

(WBPG 2012)(All India 2000)

- a. Lung
- b. Kidney
- c. Breast
- d. Stomach

141. Most common symptom of lung carcinoma:

(AIIMS 90)

- a. Cough
- b. Dyspnea
- c. Weight loss
- d. Chest pain

142. The commonest intrabronchial cause of hemoptysis is:

(AIIMS May 95)

- a. Carcinoma lung
- b. Adenoma lung
- c. Emphysema
- d. Bronchiectasis

143. A 60-years old chronic smoker presents with complaints of hemoptysis. Her chest X-ray appears to be normal. What is the next best investigation?

(All India 2001)

- a. Bronchoscopy
- b. High resolution CT
- c. Sputum cytology
- d. Pulmonary function test

144. A 60-years old man is suspected of having bronchogenic carcinoma. TB has been ruled out in this patient. What should be the next investigation?

(All India 2001)

- a. CT guided FNAC
- b. Bronchoscopy and biopsy
- c. Sputum cytology
- d. X-ray chest

145. A patient presents with a cavitary lesion in right upper lobe of lung. The best investigation is:

(All India 2000)

- a. Bronchoscopy, lavage and brushing
- b. CT scan
- c. X-ray
- d. FNAC

PULMONARY EMBOLISM**146. All of the following conditions may predispose to pulmonary embolism except:**

(All India 2003)

- a. Protein S deficiency
- b. Malignancy
- c. Obesity
- d. Progesterone therapy

147. In acute pulmonary embolism, the most frequent ECG finding is:

(AIIMS May 2006)

- a. S1Q3T3 pattern
- b. 'P' pulmonale
- c. Sinus tachycardia
- d. Right axis deviation

148. Most common symptom in pulmonary embolism:

(MCI Sept 2007)

- a. Dyspnea
- b. Pleuritic chest pain
- c. Cyanosis
- d. Hemoptysis

149. Ventilation perfusion imaging is most useful for the diagnosis of:

(COMEDK 2004)

- a. Pulmonary thromboembolism
- b. Asthma
- c. Interstitial lung disease
- d. Hypersensitivity pneumonitis

150. Gold standard to diagnose pulmonary embolism is:

(MHCET 2016)

- a. Chest X-ray
- b. Pulmonary angiography
- c. Ventilation perfusion scintiscan
- d. CT chest

151. Early and reliable indication of air embolisms during anesthesia can be obtained by continuous monitoring of:

(COMEDK 2008)

- a. ECG
- b. Blood pressure
- c. End-tidal CO₂
- d. Oxygen saturation

152. A mill-wheel type of murmur during laparoscopy suggests:

(COMEDK 2009)

- a. Tension pneumothorax
- b. Intra-abdominal bleeding
- c. Gas embolism
- d. Pre-existing valvular disease

153. Radiographic features of pulmonary embolism include all except:

(COMEDK 2011)

- a. Westermark's sign
- b. The Fleischner sign
- c. Hampton's hump
- d. Virchow sign

154. CT angiographic finding of acute pulmonary thromboembolism includes:

(PGI Nov 2011)

- a. Filling defect of main pulmonary artery
- b. Pleural fibrosis
- c. Lobar and segmental oligemia
- d. Pleural effusion
- e. Peripheral, wedge-shaped consolidations

155. Patient admitted with fracture shaft of femur in a few days developed respiratory distress, ↓SPO₂ and petechial rashes. Diagnosis:

(JIPMER 2011)

- a. Fat embolism
- b. Pulmonary embolism
- c. Hemolytic anemia
- d. Crush syndrome

156. Investigation of choice in pulmonary embolism:

(JIPMER 2010)

- a. Ventilation perfusion scan
- b. MRI
- c. CECT
- d. X-ray

157. A patient with fracture pelvis is admitted in ICU after surgery. Postoperatively he develops sudden dyspnea and chest. The likely cause is:

(AIIMS Nov 99)

- a. Pulmonary thromboembolism
- b. Shock
- c. Respiratory infection
- d. ARDS

158. All are true about pulmonary embolism, except:

- a. Chest pain is the most common symptom
- b. Most commonly presents within 2 weeks (AIIMS May 94)
- c. More is the survival time, more is the chance of recovery
- d. Arises from leg veins

159. The most common source of pulmonary embolism is:

(AIIMS May 95)

- a. Amniotic fluid embolism
- b. Calf vein thrombi
- c. Large veins of leg
- d. Cardiothoracic surgery

160. A 55-years man who has been on bed rest for the past 10 days complains of breathlessness and chest investigation should be:

(All India 2004, 2003)

- a. Lung ventilation-perfusion scan
- b. Pulmonary arteriography
- c. Pulmonary venous angiography
- d. Echocardiography

161. The most definitive method of diagnosing pulmonary embolism is:

(AIIMS Nov 2005)

- a. Pulmonary arteriography
- b. Radioisotope perfusion pulmonary scintigraphy
- c. EKG
- d. Venography

162. A young patient presents to the emergency with acute pulmonary embolism. Patients blood pressure is normal but echocardiography reveals right ventricular hypokinesia and compromised cardiac output. The treatment of choice in this patient is: (AIIMS Nov 2001)
- Thrombolytic therapy
 - Anticoagulation with low molecular weight heparin
 - Anticoagulation with warfarin
 - Inferior vena cava filters
163. In pulmonary embolism, fibrinolytic therapy is responsible for: (PGI Dec 97)
- Risk of hemorrhage
 - Prognosis good
 - Massive emboli
 - All of the above
164. IVC filter is used in following except: (PGI Dec 97)
- Massive emboli
 - Negligible size of emboli
 - Repeated emboli
 - None
165. D-Dimer is the most sensitive diagnostic test for: (DPG 2011)
- Pulmonary embolism
 - Acute pulmonary edema
 - Cardiac tamponade
 - Acute myocardial infarction
166. The sequence of symptoms in pulmonary embolism is: (JIPMER 89, DNB 90)
- Fever, pain, dyspnoea
 - Fever, dyspnoea
 - Dyspnoea, pain, hemoptysis
 - Dyspnoea, cough, purulent sputum
167. The commonest site of lodgment of pulmonary embolus is in the territory of: (UPSC 95)
- Right lower lobe
 - Right upper lobe
 - Left Lower lobe
 - Left upper lobe
168. A young male presented with dyspnea, bleeding and petchial hemorrhage in the chest after 2 days following fracture shaft of the femur right side. Most likely cause is (UPPG 2008)
- Air embolism
 - Fat embolism
 - Pulmonary thromboembolism
 - Amniotic fluid embolism
173. The ideal tidal volume in a patient ventilated for ARDS is: (COMEDK 2010)
- 6 mL/kg
 - 10 mL/kg
 - 14 mL/kg
 - 20 mL/kg
174. Adult respiratory distress syndrome is defined by all except: (COMEDK 2005)
- PCWP >18 mm Hg
 - $\text{PaO}_2/\text{FiO}_2 < 200$
 - Diffuse bilateral air space edema on chest X-ray
 - All the above
175. Which of the following is most characteristic feature of ARDS? (All India 2012)
- Diffuse alveolar damage
 - Hypoxia and hypoxemia
 - Surfactant deficiency
 - Hypocapnia
176. ARDS is associated with: (PGI Dec 2004)
- Acute pancreatitis
 - Trauma
 - Severe falciparum malaria
 - All of the above
177. Acute lung injury is characterized by all, except: (PGI Dec 2004)
- Alveolar infiltrates
 - Hypoxemia
 - Pulmonary shunting
 - $\text{PaO}_2/\text{FiO}_2 < 200$ mm of Hg
 - None of the above
178. All are seen in ARDS, except: (AIIMS May 95)
- Pulmonary edema
 - Decreased tidal volume
 - Hypercapnia
 - Decreased compliance
179. All of the following features can be seen in ARDS except:
- Pulmonary shunting
 - Reduced compliance
 - Hypoxemia
 - Hypercapnia
180. Which of the following is not seen in ARDS? (All India 96)
- Pulmonary edema
 - Hypoxemia
 - Stiff lung
 - Hypercapnia
181. In ARDS, not true is: (PGI June 99)
- Decreased pulmonary compliance
 - Increased pulmonary artery pressure
 - Increased left atrial pressure
 - Severe hypoxemia
182. Acute lung injury (ALI) is characterized by all except:
- $\text{PaO}_2/\text{FiO}_2 < 200$ mm Hg
 - Bilateral interstitial infiltrates
 - PCWP <18 mm Hg
 - Normal left atrial pressure

THORACIC INJURY

169. True regarding presentation(s) of thoracic duct injury: (PGI June 2009)
- Electrolyte imbalance
 - Lymphopenia
 - Dehydration
 - Lymphedema
 - Chylothorax may be present
170. True about chest trauma: (PGI June 2008)
- ECG done in all cases associated with sternal fracture
 - Under water seal drainage if associated with pneumothorax
 - X-ray chest investigation of choice
 - Urgent surgery needed in all cases
171. Interstitial emphysema may be found in the following conditions: (Kerala 98)
- Chest injury
 - Tracheostomy
 - Surgical wound
 - All

ADULT RESPIRATORY DISTRESS SYNDROME

172. Most common abnormality associated with ARDS: (JIPMER 2011)
- Hypoxemia
 - Hypercapnea
 - Diffuse alveolar damage
 - Bilateral alveolar infiltrates

PULMONARY TUBERCULOSIS

183. A young man with pulmonary tuberculosis presents with massive recurrent hemoptysis. For angiographic treatment, which vascular structure should be evaluated first: (All India 2004)
- Pulmonary artery
 - Bronchial artery
 - Pulmonary vein
 - Superior vena cava
184. Indications of surgery in pulmonary TB: (PGI Dec 2006)
- Suspicion of malignancy
 - Cavitary lesion with aspergilloma
 - Massive hemoptysis
 - All of the above

CARDIAC TUMORS

185. The most common primary cardiac tumor is: (COMEDK 2004)
- Rhabdomyoma
 - Myxoma
 - Leiomyoma
 - Lipoma

HEART TRANSPLANTATION

186. **Absolute contraindications of heart transplantation:** (PGI Dec 2000)
- HIV infection
 - Age >60 years
 - Irreversible pulmonary hypertension
 - Significant pulmonary vascular disease
 - Malignancy

PECTUS EXCAVATUM AND CARINATUM

187. **Regarding pectus excavatum all are true except:** (PGI Dec 97)
- Gross CVS dysfunction
 - Decrease in lung capacity
 - Cosmetic deformity
 - Depression in chest

MISCELLANEOUS

188. **CABG is done for all of the following indications except:** (All India 99)
- To reduce symptoms
 - To prevent further catastrophics
 - To prolong life
 - To prevent progress of native blood vessel disease
189. **Valvoplasty is done in following except:** (PGI Dec 97)
- Coarctation of aorta
 - PS
 - MS
 - AS
190. **Treatment of choice in postoperative lung collapse is all except:** (AIIMS June 95)
- Needle drainage
 - Corticosteroids
 - Pulmonary resection
 - Endoscopic suction
191. **Following is true of eventration of diaphragm:** (AIIMS 84)
- It is a development defect
 - Early surgery is treatment
 - Defect is usually muscular
 - Diagnosed mostly clinically
192. **Broncholithiasis means:** (Kerala 96)
- Calcified lymph nodes eroding into bronchus
 - Foreign body calcified in bronchus
 - Lithium deposition in bronchial wall
 - A hamartoma
193. **Complication to PEEP include all except:** (PGI 81, UPSC 87)
- Pulmonary edema
 - Emphysema
 - Cardiogenic shock
 - Pneumonia
194. **The greatest incidence of bronchopleural fistula is following:** (PGI 80, DPG 88)
- Segmental resection
 - Lobectomies
 - Pneumonectomies
 - Thorocotomy
195. **The most important consideration in a patient with borderline pulmonary function requiring lung resection is:** (Karnataka 2003)
- The amount of nonfunctioning lung tissue to be removed
 - The amount of functioning lung tissue to be removed
 - Experience of the surgical team
 - Elevated pulmonary artery pressure
196. **Which needle is used for pleural biopsy?** (COMEDK 2007)
- Vin silvermann's
 - Abram's
 - Abraham's
 - Osgood's
197. **Heimlich valve is used for drainage of:** (COMEDK 2008)
- Pneumothorax
 - Hemothorax
 - Emphysema
 - Malignant pleural effusion
198. **The organism most frequently related to mediastinal fibrosis is:** (DPG 2010)
- Actinomyces
 - Histoplasma
 - Hansen's bacillus
 - Staphylococcus
199. **Which is true regarding hydatid cyst of lung?** (AIIMS June 2002)
- Never ruptures
 - Calcification is common
 - Always associated with cyst in the liver
 - More common in lower lobes
200. **The commonest site for extragonadal germ cell tumour is:** (COMEDK 2009)
- Retroperitoneum
 - Sacroccygeal region
 - Pineal gland
 - Mediastinum
201. **The most popular incision for open general thoracic surgical procedures is:** (COMEDK 2010)
- Anterior thoracotomy
 - Median sternotomy
 - Lateral thoracotomy
 - Transverse thoracosternotomy
202. **Pleura ends at which level in the posterior axillary line:** (Punjab 2007)
- Medial border of 11th rib
 - Lateral border of 11th rib
 - Medial border of 12th rib
 - Lateral border of 12th rib
203. **All are indications for surgery in bronchiectasis except:** (JIPMER 2010)
- Hemoptysis
 - Copious symptoms
 - Bleeding
 - Recurrent infections
204. **Bastio surgery for refractory LV hypertrophy is:** (MHSSMCET 2006)
- Patch repair
 - MR repair
 - Ventriculectomy
 - Ventriculoplasty
205. **Resting intrapleural pressure:** (MHSSMCET 2007)
- 2 to -6 mmHg
 - +2 to +6 mmHg
 - 5 to -10 mmHg
 - 10 to +10 mmHg
206. **Topical application of mitomycin C is recommended for:** (All India 2012)
- Endoscopic treatment of angiofibroma
 - Sturge-Weber syndrome
 - Skull bone osteomyelitis
 - Laryngotracheal stenosis
207. **CXR of industrial worker exposed to asbestos over 20 years shows an ill-defined round opacity in the lower lobe with a comet tail appearance on PA-view. Which of the following is the most likely diagnosis?** (All India 2012)
- Mesothelioma
 - Bronchogenic carcinoma
 - Round atelectasis
 - Pulmonary infarct
208. **Coronary graft is most commonly taken from:** (DNB 2012)
- Femoral vein
 - Saphenous vein
 - Axillary vein
 - Cubital vein
209. **Patient can safely undergo major lung resection without increased risk of post operative complication if:** (DNB 2006)
- FEV1 > 1L, Normal DLCO
 - FEV1 > 1L, Decreased DLCO
 - FEV1 > 2L, Normal DLCO
 - FEV1 > 2L, Decreased DLCO
210. **Which of the following is false about hemoptysis?** (AIIMS Nov 2013)
- Massive hemoptysis is bleeding >600 ml in 24 hours
 - In 90% cases, bleeding from bronchial arteries
 - CT chest is the first investigation done
 - In an unstable patient, rigid bronchoscopy is done to identify the lesion
211. **Hamman's sign is seen in:** (APPG 2016)
- Pneumomediastinum
 - Diaphragmatic paralysis
 - Empyema thoracis
 - Subphrenic abscess

EXPLANATIONS

MEDIASTINAL TUMORS

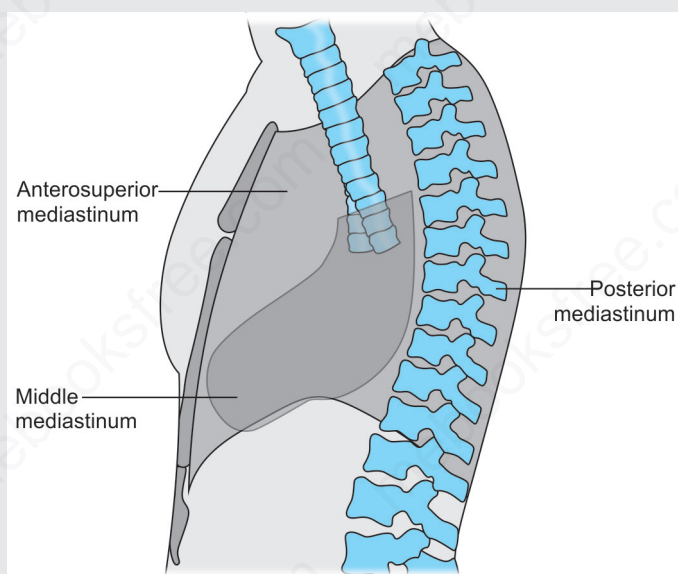
1. Ans. d. Ganglioneuroma (Ref: Sabiston 19/e p1600-1606; Schwartz 10/e p670-680, 9/e p569-576; Bailey 26/e p868-869; 25/e p892; Devita 9/e p871-881)

MEDIASTINUM

Mediastinum is situated **between the lungs in the center of the thorax**.

Mediastinum is divided into 3 compartments

Anterior or Anterosuperior	Middle or Visceral compartment	Posterior or Paravertebral sulci
Lies in front of anterior pericardium and trachea ^Q	Lies within pericardial cavity ^Q including trachea	Lies posterior to posterior pericardium and trachea ^Q .



Locations of the Common Mediastinal Masses

Anterior Mediastinum	Middle Mediastinum	Posterior Mediastinum
<ul style="list-style-type: none"> • Thymoma^Q (MC in anterior mediastinum) • Lymphoma^Q • Germ cell tumors^Q • Thyroid and parathyroid masses^Q • Bronchogenic cyst^Q • Aneurysm^Q 	<ul style="list-style-type: none"> • Cysts (MC in middle mediastinum): <ul style="list-style-type: none"> – Pericardial (MC)^Q – Bronchogenic^Q – Enterogenous – Neuroenteric^Q • Vascular masses (aneurysm^Q) • LN enlargement and lymphoma^Q • Mesenchymal tumors • Pheochromocytoma 	<ul style="list-style-type: none"> • Neurogenic tumors (MC overall^Q) • Meningoceles^Q • Mesenchymal tumors • Pheochromocytoma • Lymphoma^Q • Bochdalek hernia^Q • Bronchogenic cyst^Q • Enterogenous cyst^Q

2. Ans. d. Ganglioneuroma
 3. Ans. d. Thymic tumor
 4. Ans. c. Thymoma
 5. Ans. a. Lymphoma, b. Neuroblastoma, c. Neurogenic tumors, e. Bronchogenic cyst
 6. Ans. a. Teratoma, b. Thymoma, c. Lymphoma, e. Parathyroid carcinoma

7. Ans. a. Anterior (Ref: Sabiston 19/e p1605-1606; Schwartz 10/e p1259, 9/e p575; Bailey 25/e p892)

LYMPHOMA

- Anterior mediastinum is MC site^Q
- Occasional involvement of middle compartment and rare involvement of posterior mediastinum
- Chemotherapy and/or radiotherapy results in a cure rate of up to 90% for early-stage Hodgkin's disease and up to 60% for more advanced stages^Q.

- MC tumor of middle mediastinum: Lymphoma^Q
- MC mass of middle mediastinum: Pericardial cyst^Q

8. Ans. c. Neurofibroma (Ref: Schwartz 10/e p677-678, 9/e p570)

Mediastinal Tumors in Adults		
Tumor Type	Percentage of Total	Location
Neurogenic tumors ^Q	21	Posterior
Cysts ^Q	20	All
Thymomas ^Q	19	Anterior
Lymphomas ^Q	13	Anterior/middle
Germ cell tumors	11	Anterior
Mesenchymal tumors	7	All
Endocrine tumors	6	Anterior/middle

Mediastinal Tumors in Children		
Tumor Type	Percentage of Total	Location
Neurogenic tumors	40	Posterior
Lymphomas	18	Anterior/middle
Cysts	18	All
Germ cell tumors	11	Anterior
Mesenchymal tumors	9	All
Thymomas	Rare	Anterior

9. Ans. b. Hyperalbuminemia

(Ref: Sabiston 19/e p1603-1604; Schwartz 10/e p675-676, 9/e p572-573; Bailey 26/e p868, 25/e p892)

THYMOMA

- MC neoplasm of thymus; MC site: Anterior mediastinum^Q
- Most frequently seen in 40-60 years of age
- Most thymomas are completely surrounded by a fibrous capsule^Q
- On the basis of cell types, divided into:
 - Lymphocytic (25%)
 - Epithelial (25%)
 - Lymphoepithelial (50%)^Q

Clinical Features

- Mostly asymptomatic^Q, detected incidentally on chest X-ray
- May cause dysphagia, dyspnea, SVC syndrome and paraneoplastic syndromes^Q

Paraneoplastic Syndromes

Autoimmune	Hematological	Neuromuscular
<ul style="list-style-type: none"> • SLE^Q • Rheumatoid arthritis • Polymyositis • Sarcoidosis 	<ul style="list-style-type: none"> • Cytopenias^Q • Red cell aplasia^Q • Hypogammaglobulinemia^Q • Erythrocytosis^Q 	<ul style="list-style-type: none"> • Myasthenia gravis^Q (MC) • Neuromuscular disorders • Myotonic dystrophy • Myositis

Diagnosis

- CT: Investigation of choice for diagnosis of thymoma^Q.
- Definitive diagnosis is made on histological study^Q.

- Cytokeratin^Q is the marker that best distinguishes thymomas from lymphomas.
- CT scan: Most lymphomas are associated with marked lymphadenopathy and thymomas most frequently appear as a solitary encapsulated mass^Q.

Staging

- Masaoka staging^Q system is used.

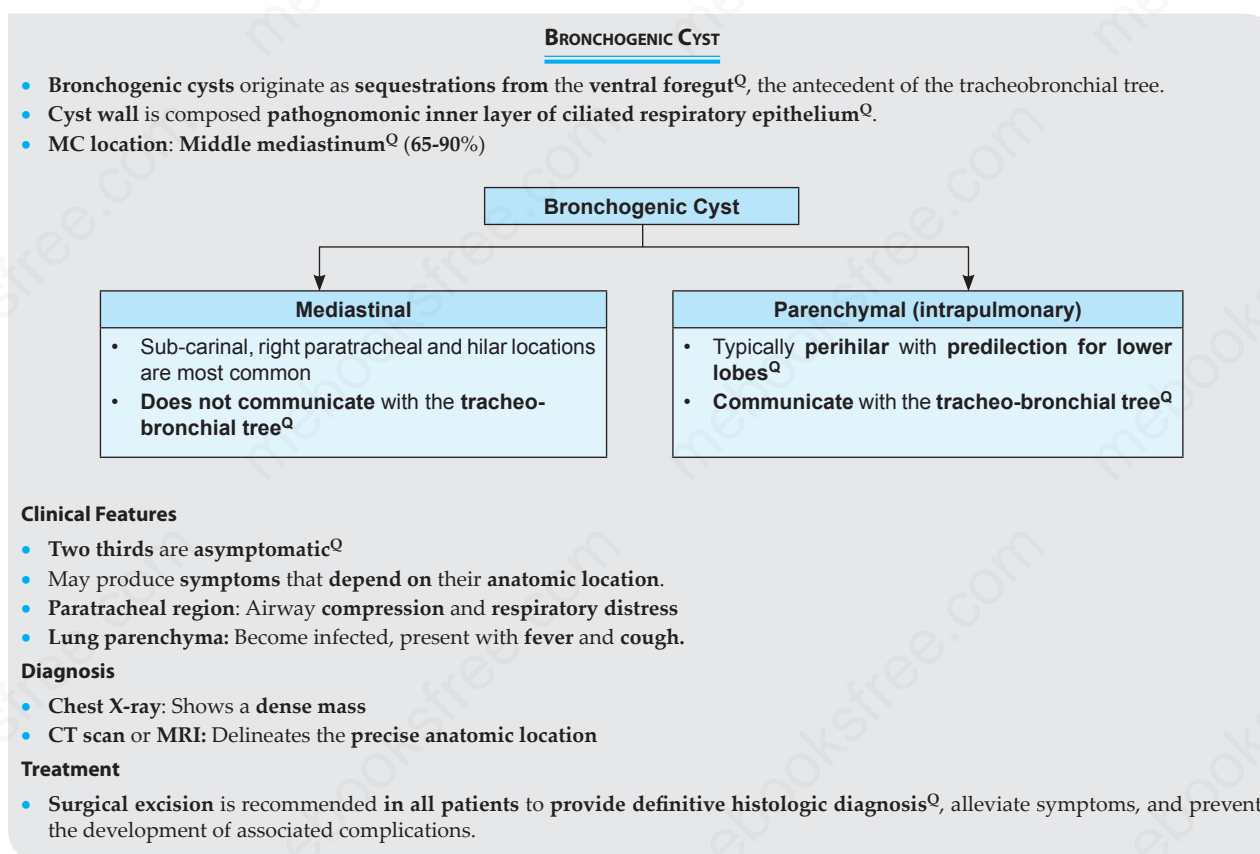
Treatment

- Treatment of choice: Total thymectomy performed through median sternotomy^Q
- Large thymoma (>5 cm) with evidence of invasion: Thymectomy + Chemotherapy^Q
- Myasthenia gravis is treated with thymectomy and anticholinesterase drugs^Q.

10. Ans. c. Thymoma

11. Ans. a. Neuroblastoma, b. Bronchogenic cyst, c. Neuroenteric cyst, d. Lymphoma

12. Ans. a. Mediastinum (Ref: Sabiston 19/e p1602-1603; Schwartz 10/e p679, 1018, 1607, 9/e p1419-1420)



13. Ans. d. Neurogenic tumour

14. Ans. a. Neurofibroma

15. Ans. b. Neurofibroma

16. Ans. a. Failure of rejection of transplanted organs (Ref: www.ncbi.nlm.nih.gov/pmc/articles/PMC2974301)

- In adult life, thymectomy has no demonstrable effect on antibody response or upon homograft survival.
- However, it has been shown that thymectomy in adult mice, combined with total body irradiation, can result in homograft tolerance of a high degree.
- This finding suggests that the thymus gland may resume its perceptor function in adult life under circumstances in which there is temporary suppression of the lymphopoietic system.

17. Ans. c. Neurogenic tumor
18. Ans. d. Schwannoma

PLEURAL EFFUSION

19. Ans. None > b. 7th intercostal space mid-axillary line (Ref: Sabiston 19/e p1595-1596; PJ Mehta 13th/361)

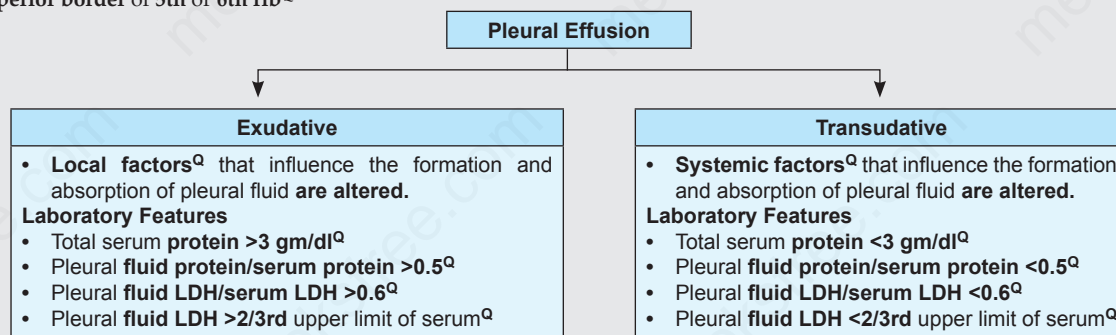
PLEURAL EFFUSION

- About 300 mL^Q of fluid is required for the development of costophrenic angle blunting seen on an upright chest X-ray.
- At least 500 mL^Q of effusion is necessary for detection on clinical examination.
- Chest tube insertion is carried out in such a way (angled chest tube, low insertion site) that drainage is as complete as possible.
- Chest tube insertion is done in 5th ICS in midaxillary line.

- Ideally chest tube insertion should be done through triangle of safety (4th to 6th intercostal space, anterior to mid-axillary line^Q)

Boundaries of Triangle of Safety

- Lateral border of pectoralis major^Q
- Anterior border of Lattissimus dorsi^Q
- Superior border of 5th or 6th rib^Q



20. Ans. d. Malignant ovarian tumour (Ref: Harrison 18/e p2181)

MEIG'S SYNDROME

- Triad of ascites, pleural effusion and benign ovarian tumor (fibroma)^Q
- It resolves after the resection of the tumor^Q.
- Because the transdiaphragmatic lymphatic channels are larger in diameter on the right, the pleural effusion is classically on the right side^Q.

21. Ans. a. T.B. (Ref: <http://radiology.rsna.org/content/216/2/478.long>)

Most common cause of pseudochyloous pleural effusion is tuberculous pleurisy.

CHYLIFORM PLEURAL EFFUSION (PSEUDOCHYLOUS OR CHOLESTEROL EFFUSION)

- Chyliform pleural effusion, often called pseudochyloous or cholesterol effusion, is a high-lipid effusion that is not chylous.
- The most common cause of this pleural reaction is tuberculous pleurisy^Q, but it has also been described in association with rheumatoid arthritis.
- The presence of a fat-fluid level within the pleural space is unique to pseudochyloous effusion^Q.

22. Ans. d. Bronchogenic carcinoma (Ref: Sabiston 19/e p1596-1597; Schwartz 10/e p680, 9/e p579; Bailey 26/e p859, 856, 25/e p881)

A rapidly filling hemorrhagic pleural effusion is suggestive of malignancy, most commonly bronchogenic carcinoma.

MALIGNANT PLEURAL EFFUSION

- Malignancy is a common cause of pleural effusion.
- Most malignant pleural effusions are exudative^Q.
- They are the second most common exudative effusive process.
- Metastatic breast and lung cancers are the most common malignancies^Q that cause malignant effusions.

PNEUMOTHORAX

23. Ans. a. Smokers (Ref: Harrison 18/e p2181; Sabiston 19/e p1599; Schwartz 10/e p649-650, 9/e p562; Bailey 26/e p853-854, 25/e p879)

PRIMARY SPONTANEOUS PNEUMOTHORAX

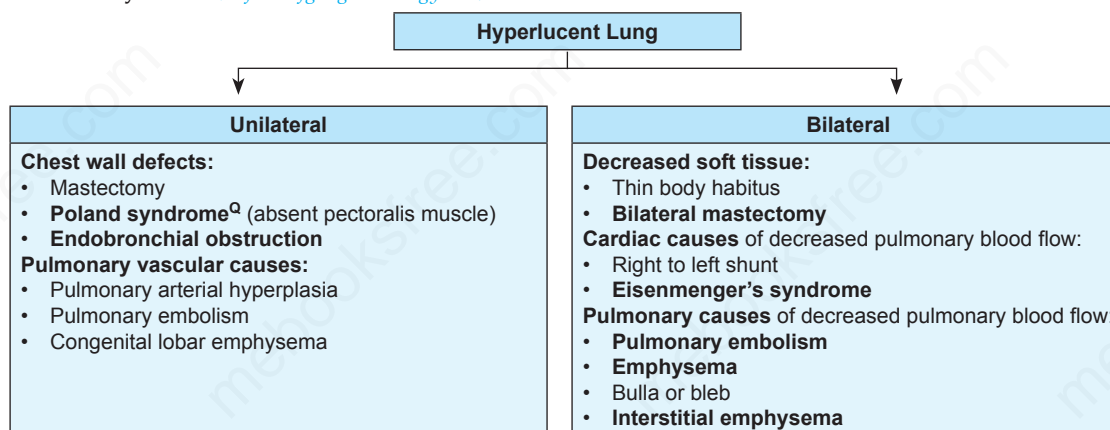
- Usually due to **rupture of apical pleural blebs**, small cystic spaces that lie within or immediately under the visceral pleura.
- Primary spontaneous pneumothorax commonly occurs in **tall, thin, adolescent men**^Q.
- Occur **almost exclusively in smokers**^Q
- Approximately **one-half of patients** with an initial primary spontaneous pneumothorax will have a **recurrence**^Q.

Treatment

- **Initial recommended treatment: Simple needle aspiration**^Q
- If the **lung does not expand with aspiration** or if the patient has a **recurrent pneumothorax**, **thoracoscopy with stapling of blebs** and **pleural abrasion** is indicated^Q.
- **Thoracoscopy or thoracotomy with pleural abrasion** is almost 100% successful in preventing recurrences^Q.

- **Small pneumothoraces (<20%)** that are stable may be monitored if the patient has few symptoms^Q.
- **Moderate (20%-40%) and large (>40%) pneumothoraces** nearly always are associated with persistent symptoms that cause physical limitations and require intervention^Q.

24. Ans. a. Poland syndrome (Ref: Wolfgang Radiology/271)



25. Ans. b. >20%

26. Ans. d. All (Ref: <http://en.wikipedia.org/wiki/Pneumothorax>)

AFTERCARE OF PNEUMOTHORAX

- **Smoking cessation**^Q
- **Air travel is discouraged** for up to 7 days^Q after complete resolution of a pneumothorax if recurrence does not occur.
- **Underwater diving is considered unsafe**^Q after an episode of pneumothorax unless a preventative procedure has been performed.

27. Ans. c. Thoracostomy and close the rent (Ref: Bailey 26/e p355, 25/e p342-343)

OPEN PNEUMOTHORAX ('SUCKING CHEST WOUND')

- This is due to a **large open defect** in the chest (**>3 cm**), leading to equilibration between intrathoracic and atmospheric pressure.
- **Air accumulates** in the **hemothorax** (rather than in the lung) with each inspiration, leading to **profound hypoventilation** on the affected side and **hypoxia**^Q.

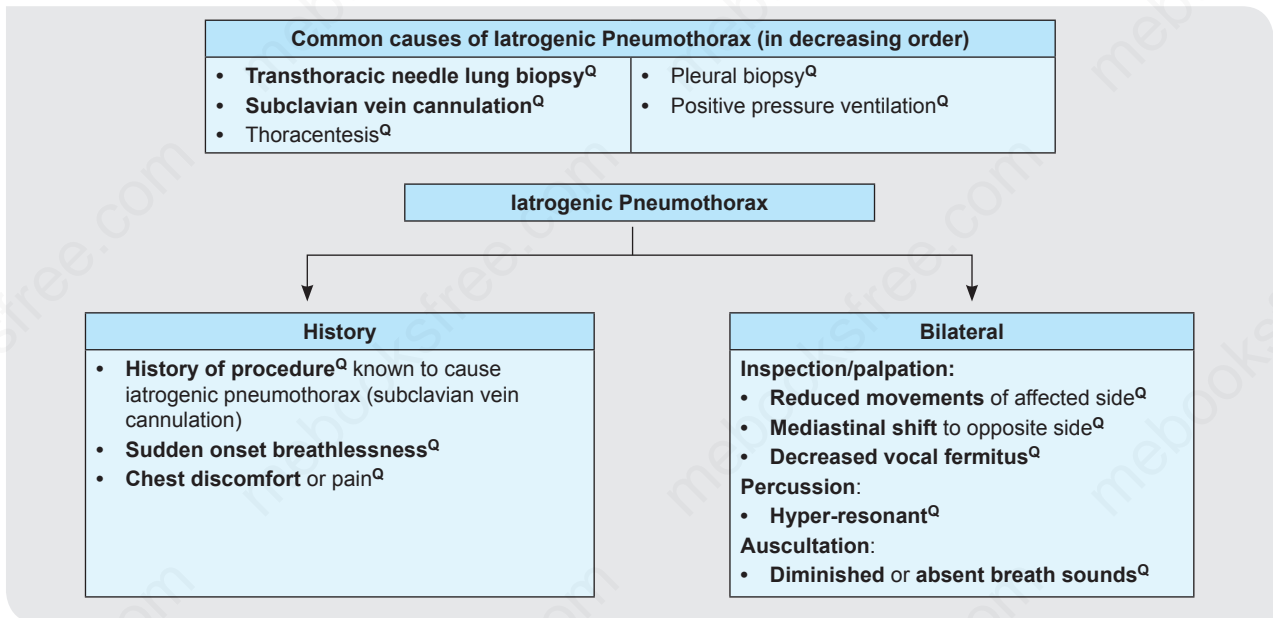
Clinical Features

- Signs and symptoms are usually **proportionate to the size of the defect**.
- If there is a **valvular effect**, increasing amounts of air will result in a **tension pneumothorax**^Q

Management

- **Initial management: Promptly close the defect**^Q
- A chest tube is inserted as soon as possible in a site remote from the injury site^Q.
- **Definitive treatment: Formal debridement and closure**^Q

28. Ans. b. Needle aspiration 29. Ans. b. 25 30. Ans. d. Intercostal drainage
 31. Ans. a. Iatrogenic pneumothorax (Ref: *Complications in Anesthesiology by Kirby (2007)/169*)



32. Ans. b. Pneumothorax 33. Ans. b. Old age 34. Ans. a. Smokers
 35. Ans. d. Often needs chest tube insertion
 36. Ans. a. Left axis deviation (Ref: <http://www.ncbi.nlm.nih.gov/pubmed/21320674>)

Common ECG changes Associated with Left-sided Pneumothorax	
<ul style="list-style-type: none"> • Right axis deviation^Q • Reduced R-wave amplitude^Q in precordial leads 	<ul style="list-style-type: none"> • QRS alterations^Q (amplitude changes) • T-wave inversions^Q

37. Ans. a. Valvular pneumothorax (Ref: *Sabiston 19/e p1599; Schwartz 10/e p163-164, 9/e p138; Bailey 25/e p342*)

TENSION PNEUMOTHORAX

- **Tension pneumothorax** occurs when the **opening** that allows **air to enter** the pleural space **functions as a one-way valve**, allowing more **air to enter** with every breath but **none to escape^Q**.
- There is **built up of positive pressure** within hemithorax, to the extent that **intrapleural pressure is greater** the atmospheric pressure causing lung to collapse^Q.

TENSION PNEUMOTHORAX

38. Ans. d. Large bore needle puncture of pleura (Ref: *Sabiston 19/e p1599; Schwartz 10/e p163-164, 9/e p138; Bailey 26/e p354, 25/e p342*)

TENSION PNEUMOTHORAX

- A tension pneumothorax develops when a '**one-way valve**' **air leak** occurs either **from the lung** or **through the chest wall^Q**.
- Air is **forced into thoracic cavity** without any means of escape, **completely collapsing the affected lung^Q**.

- **Mediastinum** is displaced to the **opposite side**, decreasing venous return and compressing the **opposite lung^Q**.

Common Causes of Tension Pneumothorax	
<ul style="list-style-type: none"> • Penetrating chest trauma^Q • Blunt chest trauma^Q (with parenchymal injury and air leak that did not spontaneously close) 	<ul style="list-style-type: none"> • Iatrogenic lung punctures (e.g. due to subclavian central venepuncture) • Mechanical positive pressure ventilation^Q

Clinical Features

- Clinical presentation is **dramatic**.
- The patient is panicky with **tachypnoea**, **dyspnoea** and **distended neck veins** (similar to pericardial tamponade)^Q.

- **Clinical examination** can reveal **tracheal deviation** (a **late finding** – not necessary to clinically confirm diagnosis), **hyperresonance** and **absent breath sounds over the affected hemithorax**^Q.

Diagnosis

- Tension pneumothorax is a **clinical diagnosis** and **treatment should not be delayed**^Q by waiting for radiological confirmation.

Treatment

- Treatment consists of **immediate decompression** by **rapid insertion** of a **large-bore needle** into the **2nd intercostal space** in the **mid-clavicular line**^Q of the affected hemithorax.
- This is **immediately followed** by **insertion of a chest tube** through the **5th intercostal space** in the **anterior axillary line**^Q.

- If the **tension** in the **pleural space** is **not relieved**, the **patient** is likely to **die from inadequate cardiac output** or **marked hypoxemia**^Q.

39. Ans. b. Tube drainage

40. Ans. a. Immediate IC tube drainage

41. Ans. b. CT-scan should be done to confirm pulmonary leak (Ref: Bailey 26/e p304, 25/e p341)

TRAUMATIC PNEUMOTHORAX

- Traumatic pneumothoraxes can result from **penetrating** and **nonpenetrating chest trauma**.
- Traumatic pneumothoraxes should be **treated with tube thoracostomy** unless they are very small.

- **Iatrogenic pneumothorax** is a **type of traumatic pneumothorax** that is becoming more common.
- **Leading causes** are **transthoracic needle aspiration**, **thoracentesis**, and the **insertion of central intravenous catheters**^Q.
- **Most** can be **managed with supplemental oxygen** or **aspiration**^Q, but if these measures are unsuccessful, a tube thoracostomy should be performed.

42. Ans. a. Insert wide bore needle in 2nd intercostal space (Ref: Sabiston 19/e p1599; Schwartz 9/e p138; Bailey 25/e p342)

- First line of management in tension pneumothorax: Insert wide bore needle in 2nd intercostal space.
- "Treatment of tension pneumothorax consists of immediate decompression by rapid insertion of a large-bore needle into the 2nd intercostal space in the mid-clavicular line^Q of the affected hemithorax."

43. Ans. d. Tension pneumothorax

44. Ans. c. Tension pneumothorax

45. Ans. a. Insertion of wide bore needle in the inter costal space

46. Ans. c. Decreased venous return

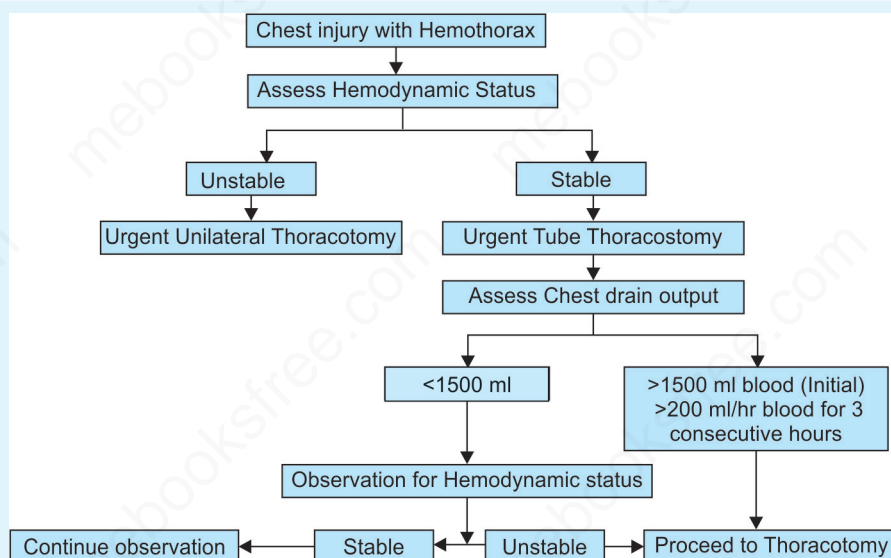
47. Ans. c. Insert needle in 2nd intercostal space

HEMOTHORAX

48. Ans. b. Hemodynamic status, e. Nature of chest tube output (Ref: Bailey 26/e p355, 357, 25/e p345; Trauma Manual: Companion to trauma 4th/165)

- Nature of chest tube drainage and Hemodynamic status both provide vital clues that may form an indication of surgery (Thoracotomy). However a deteriorating **hemodynamic status despite adequate volume resuscitation** should form the **most important guide, for urgent emergency thoracotomy** and is the **single best answer of choice**.

- Bailey says "If the patient is **in extremis** with a **falling systolic blood pressure**, despite volume resuscitation, there is no choice but to proceed **immediately with a left anterolateral thoracotomy**".



Indications of Thoracotomy

- | | |
|--|---|
| <ul style="list-style-type: none"> Initial tube thoracostomy drainage of >1000 ml (penetrating injury)^Q or >1500 ml (blunt injury)^Q Ongoing tube thoracostomy drainage of >200 ml/hr for 3 consecutive hours^Q in non-coagulopathic patients Caked hemothorax^Q despite of placement of two chest tubes Tracheo-bronchial injury^Q | <ul style="list-style-type: none"> Selected descending torn aorta or great vessel injury^Q Pericardial tamponade^Q Cardiac herniation^Q Massive air leak^Q from chest tube with inadequate ventilation Open pneumothorax^Q Esophageal perforation^Q |
|--|---|

49. Ans. d. Open thoracotomy with ligation of vessel

50. Ans. a. Seen in choriocarcinoma, b. Supine posture is better than erect posture, c. Needle aspiration may be needed for diagnosis (Ref: Harrison 18/e p2180; Schwartz 10/e p200, 9/e p771; Bailey 26/e p355, 25/e p345)

HEMOTHORAX

- Causes: Trauma (MC), tumor, tuberculosis^Q
- Massive hemothorax is usually the result of major pulmonary vascular injuries or major arterial wounds while minor injuries can cause small hemothorax.

Diagnosis

- Diagnosis is made by **needle aspiration of pleural fluid^Q**.
- Chest X-ray: To assess the presence and extent of pleural cavity collection^Q

- A **supine position with horizontal X-ray beam (decubitus position)** is better than erect film, as about **400-500 ml** of blood may be hidden by diaphragm on upright chest X-ray^Q.

Management

- Most patients with hemothorax should be treated with **tube thoracostomy**, which allows **continuous quantification of bleeding^Q**.
- In most of the cases **bleeding stops as the lung re-expands^Q**.
- Thoracoscopy or thoracotomy: Pleural hemorrhage **>200 mL/hour^Q**

51. Ans. d. Major artery

LUNG ABSCESS

52. Ans. a. Antibiotics according to organisms (Ref: Harrison 18/e p2145-2146; Sabiston 19/e p1586; Schwartz 10/e p650-651, 9/e p549-551; Bailey 26/e p870, 25/e p893)

LUNG ABSCESS

- Lung abscess refers to a **microbial infection** of the **lung** that results in necrosis of the pulmonary parenchyma.
- MC cause of **primary lung abscess**: **Anaerobic bacteria**^Q
- Etiology of anaerobic lung abscess: **Aspiration**^Q

Routes of Infection

- **Aspiration of organisms** that colonize oropharynx (MC)^Q
- **Inhalation** of infection or aerosols
- **Hematogenous** dissemination from extra-pulmonary site
- **Direct inoculation** (as in tracheal intubation or stab wounds)
- **Contiguous spread** from an adjacent site of infection

Clinical Features

- Classic presentation: An **indolent infection** that evolves over **several days or weeks**, usually in a host who has a **predisposition to aspiration**^Q.
- A **common feature** is **periodontal infection** with **pyorrhea** or **gingivitis**.
- Symptoms: **Fatigue, cough, sputum production**, and **fever**^Q Chills are uncommon.

Diagnosis

- Lung abscess can be detected by **chest X-ray** and **CT**
- **CT scan**: Investigation of choice for lung abscess^Q

Treatment

- Treatment depends on the **presumed** or **established etiology**.
- Infections caused by **anaerobic bacteria**: **Clindamycin**^Q

- Persistence of fever beyond 5–7 days or progression of the infiltrate suggests **failure of therapy** and a need to **exclude** factors such as **obstruction, complicating empyema**, and **involvement of antibiotic-resistant bacteria**^Q.

- Lung abscess due to **S. aureus**: **Vancomycin**^Q
- Indications for surgery: **Failure to respond** to medical management, **suspected neoplasm**, and **hemorrhage**^Q.

Causes of Failures of Medical Management

- | | |
|---|--|
| <ul style="list-style-type: none"> • Failure to drain pleural collections^Q • Inappropriate antimicrobial therapy^Q • Obstructed bronchus^Q | <ul style="list-style-type: none"> • Giant abscess^Q • Resistant pathogen^Q • Refractory lesions^Q |
|---|--|

53. Ans. d. Intracavitary antibiotic instillation (Ref: Harrison 18/e p2146; Sabiston 19/e p1586; Schwartz Schwartz 10/e p650-651, 9/e p550-551; Bailey 26/e p870, 25/e p893)

TREATMENT OF LUNG ABSCESS

- Patients who **do not respond** to **initial regimen** and who **do not have surgical indications**, **early percutaneous drainage** is done^Q.
- When surgery is indicated, **lobectomy** is the **preferred choice**^Q.
- **Tube thoracotomy** and **open pleural drainage** is also done for lung abscess^Q.

54. Ans. d. Pneumonia (Ref: Sabiston 19/e p1597-1598; Bailey 26/e p856, 25/e p881-882)

Complications of Empyema

- | | |
|--|--|
| <ul style="list-style-type: none"> • Empyema necessitans (spontaneous decompression of pus through the chest wall^Q) • Chronic empyema (with entrapped lung and pulmonary restrictive disease) • Pericarditis^Q | <ul style="list-style-type: none"> • Osteomyelitis or chondritis of the ribs or vertebrae • Mediastinitis^Q • Bronchopleural fistula^Q • Disseminated infection of CNS |
|--|--|

55. Ans. a. Aspiration

56. Ans. a. Left upper lobe (Ref: Schwartz 9/e p549)

LUNG ABSCESS

- **Right upper and lower lobes** are **most commonly affected** followed by **left lower lobe** and **right middle lobe**^Q.

57. Ans. a. Direct extension from liver (Ref: Harrison 18/e p2145; Sabiston 19/e p1586; Schwartz 9/e p550)

AMEBIC LUNG ABSCESS

- Amebic lung abscess is a result of **direct spread of infection** from **liver to lung**^Q.
- Infection spread directly through the **diaphragm**^Q.
- MC area of lung involved: **Right lower lobe**^Q

58. Ans. d. Continued productive cough with purulent material

- The clinical sign of getting BPF is outlined as continued productive cough with purulent material, especially when a patient is rolled on the side having Fistula^Q.

59. Ans. a. Pott's spine

60. Ans. d. Pleural empyema is showing extension to the subcutaneous tissue

61. Ans. d. Strongyloides stercoralis (Ref: Bailey 24/e p117)

Parasitic Causes of Empyema	
<ul style="list-style-type: none"> Paragonimus wetermani^Q E. granulosus^Q 	<ul style="list-style-type: none"> Entamoeba coli^Q

PLEURAL COLLECTIONS

62. Ans. d. TOC is excision and ligation of thoracic duct (Ref: Sabiston 19/e p1598-1599; Schwartz Schwartz 10/e p685-687, 9/e p580-582; Bailey 26/e p938, 25/e p958)

CHYLOTHORAX

- A chylothorax occurs when the thoracic duct is disrupted and chyle accumulates in the pleural space.
- MC cause of chylothorax: Trauma (most frequently thoracic surgery^Q)
- More common on right side^Q

Clinical features

- Patients with chylothorax present with dyspnea, chest pain, fatigue

- Thoracentesis reveals milky fluid^Q
- TG level >1.2 mmol/L (110 mg/dL^Q).

Diagnosis

- Chest X-ray: Large pleural effusion^Q
- Patients with chylothorax and no obvious trauma should have a lymphangiogram and a mediastinal CT scan to assess the mediastinum for lymph nodes^Q.

Treatment

- Treatment of choice: Chest tube insertion + Administration of octreotide and Medium chain triglycerides^Q.
- If these modalities fail, a pleuroperitoneal shunt should be placed unless the patient has chylous ascites.
- An alternative treatment is ligation of the thoracic duct^Q.
- Patients with chylothoraxes should not undergo prolonged tube thoracostomy with chest tube drainage because this will lead to malnutrition and immunologic incompetence^Q.

63. Ans. d. Bile duct stones (Ref: <http://en.wikipedia.org/wiki/Chyluria>; Bailey 26/e p938, 25/e p958)

CHYLURIA

- Filariasis is the MC cause, with chyluria occurring in 1–2% of cases 10–20 years after initial infestation.

Causes of Chyluria	
<ul style="list-style-type: none"> Filariasis^Q Ascariasis Malaria Tumour 	<ul style="list-style-type: none"> Tuberculosis^Q Pregnancy^Q Childbirth^Q

Clinical Features

- It usually presents as painless passage of milky white urine, particularly after a fatty meal.
- The chyle may clot, leading to renal colic, and hypoproteinaemia may result.

Diagnosis

- Intravenous urography and/or lymphangiography will often demonstrate the lymphourinary fistula.

Treatment

- Treatment includes a low-fat and high protein diet, increased oral fluids to prevent clot colic, and laparotomy and ligation of the dilated lymphatics.
- Attempts have also been made to sclerose the lymphatics either directly or via instrumentation of the bladder, ureter and renal pelvis.

SEQUESTRATION OF LUNGS

64. Ans. b. Descending abdominal aorta (Ref: Sabiston 19/e p1836-1837; Schwartz Schwartz 10/e p1607, 9/e p1418; Bailey 26/e p870, 25/e p894)

PULMONARY SEQUESTRATION

- Malformations of the lung without bronchial communication with an aberrant systemic blood supply^Q.
- MC site: Posterobasal segment of left lower lobe^Q
- Presentation is with recurrent chest infection^Q.

Intralobar	Extralobar
<ul style="list-style-type: none"> • Reside within lung parenchyma^Q • Infrequently associated with other anomalies^Q • Found within the medial or posterior segments of the lower lobes • Two thirds occurring on left side^Q. • In 85% of cases supplied by an anomalous systemic vessel arising from the infradiaphragmatic aorta^Q, located within the inferior pulmonary ligament. • Venous drainage through the inferior pulmonary vein. • Because of the risk for infection and bleeding, usually removed, either by segmentectomy or lobectomy^Q. 	<ul style="list-style-type: none"> • Surrounded by a separate pleural covering^Q • Occur predominantly in males^Q • More common on the left side^Q. • In 40%, multiple other anomalies^Q are encountered. • Usually asymptomatic^Q • Because there is usually no bronchial communication, the risk for infection is low. • Many of these malformations may be observed^Q.

Diagnosis

- CT is preferred modality for diagnosis of pulmonary sequestration^Q.

- Historically, angiography was considered an important preoperative study before embarking on resection of a sequestration.
- More recently, CT and MRI have replaced the need for angiography and provide excellent mapping of the blood supply^Q.

65. Ans. b. Left posterior basal
 66. Ans. b. 50-70% occur in lung, c. Are commonly infected, d. Multilobar
 67. Ans. b. They arise from anomalous development of foregut
 68. Ans. d. Posterior basal segment of lower lobe
 69. Ans. c. Bronchus 70. Ans. b. Descending aorta 71. Ans. a. CT

TRACHEOBRONCHIAL FOREIGN BODY

72. Ans. a. Right posterior basal (Ref: Schwartz 9/e p1420; Bailey 26/e p859, 25/e p884)

TRACHEOBRONCHIAL FOREIGN BODY

- Aspiration of foreign bodies most commonly occurs in the **toddler age**^Q group.
- Peanuts are the object **most frequently aspirated**^Q.
- MC anatomic location for a foreign body is the **right main stem bronchus** or the **right lower lobe**^Q.

Clinical Features

- The child usually will **cough** or **choke while eating** but may then become **asymptomatic**.
- **Total respiratory obstruction** may occur with a **tracheal foreign body**; however, respiratory distress is usually mild if present at all.
- A **unilateral wheeze** is often heard on **auscultation**^Q.

Diagnosis

- Chest X-ray: Radiopaque foreign body

- **Bronchoscopy (rigid)** confirms the diagnosis and allows removal of the foreign body^Q.

Complications

- A **solid foreign body** often will cause **air trapping**, with **hyperlucency** of the affected lobe or lung seen especially on expiration.
- Delay in diagnosis can lead to **atelectasis** and **infection**^Q.

73. Ans. c. Apical part of the lower lobe 74. Ans. a. Decreased ventilation perfusion ratio

VATS

75. Ans. c. Collapse of ipsilateral lung (Ref: Sabiston 19/e p1570; Schwartz Schwartz 10/e p704, 9/e p522; Bailey 26/e p957, 25/e p881-883)

VIDEO ASSISTED THORACOSCOPIC SURGERY (VATS)

- In contrast to most laparoscopic techniques, the **working space for VATS** is created not by adding an insufflating gas but rather by **removing air from the ipsilateral lung parenchyma** causing **collapse of the ipsilateral lung**^Q.
- Used for **pulmonary decortication, pleurodesis, and lung or pleural biopsies**

76. Ans. b. Video assisted thoracoscopic surgery

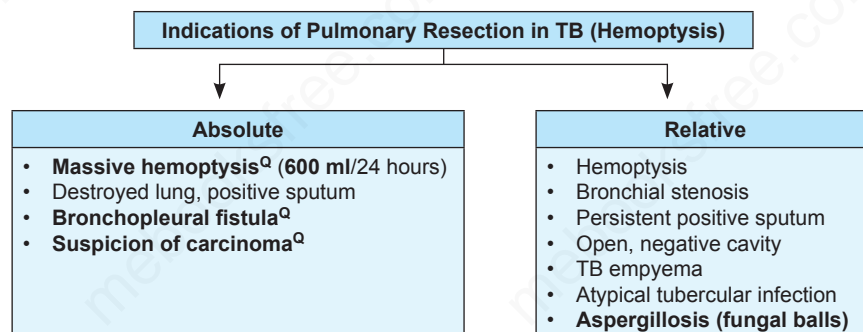
THORACOTOMY

77. Ans. d. Rib fracture (Ref: Sabiston 19/e p438; Schwartz 9/e p159; Bailey 26/e p357, 25/e p345-346, 888-891)

Indications of Thoracotomy	
<ul style="list-style-type: none"> • Initial tube thoracostomy drainage of >1000 ml (penetrating injury)^Q or >1500 ml (blunt injury)^Q • Ongoing tube thoracostomy drainage of >200 ml/hr for 3 consecutive hours^Q in non-coagulopathic patients • Caked hemothorax^Q despite of placement of two chest tubes • Tracheo-bronchial injury^Q 	<ul style="list-style-type: none"> • Selected descending torn aorta or great vessel injury^Q • Pericardial tamponade^Q • Cardiac herniation^Q • Massive air leak^Q from chest tube with inadequate ventilation • Open pneumothorax^Q • Esophageal perforation^Q

78. Ans. d. Pulmonary contusion

79. Ans. a. Profuse uncontrolled bleeding, c. Bronchial adenoma, d. Bronchial fistula (Ref: Tuberculosis by William N. Rom/519; Harrison 18/e p1371-1373)



80. Ans. c. Rhomboides major (Ref: Sabiston 19/e p1570; Farquharson's Operative Surgery 9/e p132)

POSTEROLATERAL THORACOTOMY

- Posterolateral thoracotomy is the **most frequently used operation** to access the thorax^Q.
- Incision is made through **5th intercostal space**^Q.

Following muscles may be cut in Posterolateral Thoracotomy	
<ul style="list-style-type: none"> • Lattisimus dorsi^Q • Serratus anterior^Q 	<ul style="list-style-type: none"> • Trapezius^Q • Intercostal muscles^Q

81. Ans. b. Pulmonary contusion 82. Ans. a. Internal mammary artery
83. Ans. a. Scapular and sternal fractures

BENIGN LUNG TUMORS

84. Ans. a. Hamartoma (Ref: Schwartz 9/e p526; Bailey 26/e p867, 25/e p891)

PULMONARY HAMARTOMA

- MC benign tumor of lung: **Hamartoma**^Q
- Most commonly, **hamartomas** are manifested by **overgrowth of cartilage**.
- Typically seen in **40-60 years of age**, **more common in males**.
- Usually **peripheral**, grow slowly in the lung.
- Chest X-ray: **Popcorn calcification** is **diagnostic**^Q.

85. Ans. c. Recurrent hemoptysis (Ref: Harrison 18/e p753)

BRONCHIAL ADENOMA

- Centrally located slow-growing endobronchial lesions that are generally carcinoid tumors (80%), adenocystic tumors (so called cylindromas, 10–15%), or mucoepidermoid tumors (2–3%).
- Mean age at presentation is 45 years (range 15–60).

Clinical Features

- MC symptom: Recurrent Hemoptysis^Q
- History of chronic cough, intermittent hemoptysis^Q, or repeated episodes of airway obstruction with atelectasis, or pneumonias with abscess formation due to endobronchial lesions obstructing the airway.

Diagnosis

- Usually visible at bronchoscopy but are highly vascular and may bleed profusely after a bronchoscopic biopsy^Q.

Treatment

- They are largely curable by surgical resection (local excision), but they may recur locally or become invasive and metastasize^Q.
- Five-year survival after resection is 95% for localized disease.

86. Ans. c. Recurrent hemoptysis

87. Ans. c. Carcinoid syndrome does not manifest (Ref: Robbins 8/e p729; Harrison 18/e p3061-3062)

BRONCHIAL CARCINOID

- Bronchial carcinoids (least malignant) are the most indolent of the spectrum of pulmonary neuroendocrine tumors
- Most patients are <40 years; Not related to smoking^Q

- Lower respiratory tract (Bronchus, lung, trachea) is the MC site of carcinoid tumor^Q
- Carcinoid syndrome is uncommon^Q

Pathology

- Most tumors are confined to main stem bronchus, commonly projects into the lumen^Q
- Some tumors penetrate the bronchial wall to fan out in the peri-bronchial tissue producing the collar-button lesion^Q

Most bronchial carcinoids

- Do not have secretory activity^Q
- Do not metastasize to distant sites^Q
- Are amenable to resection^Q

88. Ans. c. Adenoma bronchus

MESOTHELIOMA

89. Ans. a. Bilaterally symmetrical (Ref: Sabiston 19/e p1599; Schwartz 10/e p688, 9/e p582-584; Bailey 25/e p881)

MALIGNANT MESOTHELIOMA

- Malignant mesothelioma is MC tumor of the pleura^Q
- In 20% of malignant mesotheliomas, the tumor arises from peritoneum^Q
- Exposure to asbestos^Q is the major known risk factor
- More common in males^Q, most common after 40 years of age.

- Three types: Epithelial, sarcomatous, and biphasic^Q
- Epithelial types are associated with a more favorable prognosis^Q

Pathophysiology

- Physical characteristics of specific fibers (referred to as serpentine or amphibole) have been shown to be important.

- Serpentine fibers: Large and curly, not able to travel beyond larger airways.
- Straight amphibole fibers: In particular the crocidolite^Q fibers navigate distally into the pulmonary parenchyma, most clearly associated with mesotheliomas.

- Latency period between asbestos exposure and the development of mesothelioma is at least 20 years.

- Multicentric tumor with multiple pleura-based nodules coalescing to form sheets of tumor (but not bilaterally symmetrical^Q)

- Natural history of the disease in untreated patients culminates in death due to local extension.

Clinical Features

- Most patients present with **dyspnea** and **chest pain**^Q.
- Over 90% have a **pleural effusion**^Q.

Diagnosis

- Results of **thoracentesis** are **diagnostic** in <10% of patients.
- **Chest X-ray**: **Pleural effusion**, generalized **pleural thickening** and **shrunk hemithorax**^Q.
- **Thoracoscopy** or **open pleural biopsy** with **special staining** of tumor samples is **required to differentiate mesotheliomas from adenocarcinomas**^Q.

Management

- **No effective therapy**^Q
- **Treatment options**: Supportive care only, surgical resection, and multimodality approaches (using a combination of surgery, chemotherapy, and radiation therapy).

Differentiation of Mesothelioma from Adenocarcinoma		
	Mesothelioma	Adenocarcinoma
CEA	Negative	Positive ^Q
Vimentin	Positive ^Q	Negative
Low molecular weight cytokeratins	Positive ^Q	Negative
Electron microscopic features	Long, sinuous villi	Short, straight villi with fuzzy glycocalyx

90. Ans. a. Asbestosis

91. Ans. e. All of the above

SQUAMOUS CELL CARCINOMA

92. Ans. b. Squamous cell carcinoma

ADENOCARCINOMA

93. Ans. a. Common in females, d. Peripheral involvement is common (Ref: Harrison 18/e p738-751; Sabiston 19/e p1573-1582; Schwartz 10/e p679,1018,1607, 9/e p529-538; Bailey 26/e p859-867, 25/e p884-888; Devita 9/e p799-812)

BRONCHOGENIC CARCINOMA

- **MC type of lung neoplasm**^Q
- Arises from **respiratory epithelium** of bronchi, bronchioles and alveoli
 - **MC visceral malignancy and leading cancer causing death: CA lung**^Q
- **Mostly arise from lung hilum** except bronchoalveolar carcinoma and some adenocarcinoma^Q.
- **Mucinous bronchoalveolar carcinoma** tends to **spread aerogenously** forming **satellite tumors**^Q.

Etiology and Risk factors	
<ul style="list-style-type: none"> • Smoking^Q (both active and passive) • Air pollution (Radon^Q) • Exposure to asbestos, uranium and nickel^Q 	<ul style="list-style-type: none"> • Old infarct and lung scars (most progress to adenocarcinoma^Q) • Ionizing radiation exposure^Q

Oncogenic abnormality	
Small Cell Carcinoma	Non-small Cell Carcinoma
<ul style="list-style-type: none"> • Over expression of bcl-2, myc and telomerase^Q 	<ul style="list-style-type: none"> • Over expression of bcl-2 and telomerase with abnormal ras gene^Q • K-ras mutation is MC mutation (90%) in adenocarcinoma^Q

Clinical Features

- **MC symptoms** are **cough**^Q (MC) > dyspnea > chest pain > hemoptysis.
- Slightly **more common** on **right side**, more frequently occurs in **upper lobes**^Q
- **Major source of hemoptysis** are **bronchial arteries**^Q
- Endobronchial growth of central tumors cause cough, stridor, wheeze and dyspnoea
- **Peripheral tumors** present as **pain** due to pleural or chest wall involvement

Symptoms due to regional spread	
<ul style="list-style-type: none"> • Tracheal obstruction, esophageal compression, RLN paralysis^Q • Pancoast syndrome^Q (involvement of C8T1 nerves by pancoast tumor causing pain in ipsilateral shoulder and arm^Q) 	<ul style="list-style-type: none"> • Horner's syndrome • SVC syndrome (MC cause is small cell carcinoma > SCC)^Q • Malignant pleural effusion^Q

Metastases

- MC site of metastases are **adrenal**^Q > **liver** > **brain**
- CA lung is MC **primary** for metastasis to Kidney, Esophagus, Pancreas, Spleen, Liver, Adrenal, Brain, Skin (**KEPS LABS**^Q)

Paraneoplastic syndromes	
<ul style="list-style-type: none"> • CVS: Thrombophlebitis, non-bacterial thrombotic endocarditis • Metabolic: <ul style="list-style-type: none"> – Inappropriate ACTH and ADH secretion (small cell)^Q – Hypercalcemia (SCC)^Q • Acanthosis nigricans (adenocarcinoma), dermatomyositis, ichthyosis, erythema gyretum repens 	<ul style="list-style-type: none"> • GIT: Carcinoid syndrome • Erythrocytosis • Neuromuscular: <ul style="list-style-type: none"> – Dementia, optic neuritis, retinopathy, limbic encephalitis – Autonomic neuropathy (small cell)^Q – Lambert-Eaton syndrome^Q (small cell) – Polymyositis, cerebellar degeneration^Q

Diagnosis and Staging

- **Tissue diagnosis:** Tumor tissue can be obtained by **bronchial** or **transbronchial biopsy**^Q through **fiberoptic bronchoscopy**^Q; by percutaneous biopsy of enlarge node
- **Integrated PET-CT scan** is the **best imaging modality**^Q for diagnosis and staging

94. Ans. a. Surgery (Ref: Harrison 18/e p745-747; Sabiston 19/e p1577-1582; Devita 9/e p808-822)

7TH AJCC TNM CLASSIFICATION OF LUNG CANCER

Tis: Carcinoma in situ

T1a: Tumor ≤2 cm in greatest dimension

T1b: Tumor >2 cm but ≤3 cm in greatest dimension

T2: Tumor >3 cm but ≤7 cm or tumor with any of the following features:

- Involves **main bronchus**, ≥2 cm distal to the carina
- Invades **visceral pleura**
- Associated with **atelectasis** or **obstructive pneumonitis** that extends to the hilar region but does not involve the entire lung

T2a: Tumor >3 cm but ≤5 cm in greatest dimension

T2b: Tumor >5 cm but ≤7 cm in greatest dimension

T3: Tumor >7 cm or one that **directly invades any of the following:** chest wall (including superior sulcus tumors), diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium; or:

- Tumor in the **main bronchus** <2 cm distal to the carina but without involvement of the carina; or
- Associated atelectasis or obstructive pneumonitis of the **entire lung** or
- **Separate tumor nodule(s)** in the same lobe.

T4: Tumor of any size that **invades any of the following:** mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina; or

- **Separate tumor nodule(s)** in a different ipsilateral lobe

N1: Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes , including involvement by direct extension
N2: Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
N3: Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)
M1a: Separate tumor nodule(s) in a contralateral lobe ; tumor with pleural nodules or malignant pleural (or pericardial) effusion
M1b: Distant metastasis

AJCC 7th Edition TNM Stage Groupings			
Stage	T	N	M
Occult cancer	TX	N0	M0
0	Tis	N0	M0
IA	T1a/b	N0	M0
IB	T2a	N0	M0
IIA	T2b T1a/b; T2a	N0 N1	M0 M0
IIB	T2b T3	N1 N0	M0 M0
IIIA	Any T1; T2 T3 T4	N2 N1/N2 N0/N1	M0 M0 M0
IIIB	T4 Any T	N2 N3	M0 M0
IV	Any T	Any N	M1a/b

Treatment of Operable NSCL

- Stage IA, IB, IIA, IIB: Surgical resection^Q
- Adjuvant chemotherapy is given in stage II^Q
- Stage IIIA with minimal N2 involvement: Neoadjuvant chemotherapy followed by surgical resection with complete mediastinal LN dissection^Q
- Postoperative radiotherapy for patients found to have N2 disease^Q

95. Ans. d. Peripheral location

96. Ans. b. Adenocarcinoma

97. Ans. a. Adenocarcinoma of lung

SMALL CELL CARCINOMA

98. Ans. c. Chemosensitive tumor (Ref: Harrison 18/e p738, 751; 17/e p551-554)

Small cell carcinomas are highly chemosensitive with an overall 90% regression rate with chemotherapy.

Property	Small cell Carcinoma	Non small cell Carcinoma
Location	• Central location ^Q	• Peripheral location ^Q
Metastasis	• Highly metastatic lesion with widespread metastasis at time of diagnosis. • Common site of metastasis include brain, bone, liver and adrenals ^Q	• Less metastatic than small cell carcinoma
Paraneoplastic syndrome	• ACTH ^Q • Calcitonin ^Q • Gastrin Releasing peptide • AVP (Vasopression) ^Q • ANF ^Q	• PTH-rp ^Q
Response to chemotherapy	• Superior response ^Q • Overall regression rate 90% ^Q • Rate complete regression in 30%	• Inferior response • Objective shrinkage in 30-50% • Complete response: uncommon

99. Ans. a. Small cell carcinoma

100. Ans. b. Chromagranin

101. Ans. d. Noradrenaline

102. Ans. a. Small cell anaplastic

103. Ans. a. Hypercalcemia, c. Watery diarrhea

104. Ans. a. Commonest malignancy of lung

105. Ans. c. Chemosensitive tumor

106. Ans. b. Small cell carcinoma

107. Ans. b. Growth hormone

108. Ans. b. Oat cell type

109. Ans. c. Small cell carcinoma of lung

110. Ans. a. Small cell carcinoma

CARCINOMA LUNG

111. Ans. c. Oat cell variant is typically associated with hilar adenopathy (Ref: Sabiston 19/e p1573-1582; Schwartz 10/e p623-645, 9/e p529-538; Bailey 26/e p859-867, 25/e p884-888; Devita 9/e p799-812; Harrison 18/e p738-751)

- Small cell carcinoma or oat cell variant is associated with **massive hilar or mediastinal lymphadenopathy, mediastinal invasion and perihilar mass**

WHO Classification of Carcinoma Lung			
Adenocarcinoma	Squamous Cell Carcinoma	Small Cell Carcinoma	Large Cell Carcinoma
<ul style="list-style-type: none"> MC histological type^Q MC in non-smokers, young patients, females^Q Located peripherally^Q Slow growth and propensity to metastasize to opposite lung^Q Metastasize more frequently to CNS^Q Most cells contain mucin^Q Noguchi classification^Q is used for adenocarcinoma 	<ul style="list-style-type: none"> MC in smokers^Q MC type in India MC variety associated with hypercalcemia (produces PTH-rp)^Q Central^Q in distribution Prone to undergo central necrosis and cavitation^Q Pancoast tumor is histologically SCC^Q Associated with best prognosis^Q 	<ul style="list-style-type: none"> Most malignant, central^Q in distribution, strongly related to smoking^Q Cells are small with little cytoplasm called "oat cell"^Q Associated with massive hilar or mediastinal lymphadenopathy, mediastinal invasion and perihilar mass^Q MC variety associated with paraneoplastic syndrome, hypokalemia and SVC syndrome^Q Most responsive to chemotherapy (cisplatin + etoposide) Shows response to radiotherapy^Q Hormones produced by small cell carcinoma: ACTH, AVP (vasopressin), calcitonin, ANF, gastrin releasing peptide^Q 	<ul style="list-style-type: none"> Highly undifferentiated with cavitating nature Metastasize early with poor prognosis

112. Ans. d. Gefitinib is most effective for female smokers with adenocarcinoma histology (Ref: Harrison 18/e p751; Davidson 21st/703)

- Gefitinib** is an oral small molecule tyrosine kinase inhibitor **approved for treatment of patients with NSCLC**. Data to support the use of Gefitinib in NSCLC are however diminishing and **Gefitinib is most effective in females** who have **never smoked** with adenocarcinoma histology.
- Single agent chemotherapy is preferred for elderly patients (>70 years).

Contraindication to Surgical Resection in NSCLC	
<ul style="list-style-type: none"> Distant metastasis (M1)^Q Invasion of central mediastinal structures including heart, great vessels, trachea and esophagus (T4)^Q Malignant pleural effusion (M1)^Q 	<ul style="list-style-type: none"> Contralateral mediastinal nodes (N3)^Q FEV1 <0.8 L^Q Severe or unstable cardiac or other medical conditions^Q

113. Ans. d. Hypercalcemia

114. Ans. d. Superior vena caval obstruction (Ref: Harrison 18/e p2266; 17/e p554)

SUPERIOR VENA CAVA (SVC) SYNDROME

- Clinical manifestation of SVC obstruction, with severe reduction in venous return from head, neck and upper extremities.
- MC cause is **Lung cancer (small cell and squamous cell carcinoma)**^Q, along with **lymphoma** and **metastatic tumors** responsible for more than 90% of all SVC syndrome.
- In young adults, **malignant lymphoma** is the **leading cause** of SVC syndrome^Q.

Clinical Features

- Patients present with **neck and facial swelling** (especially around the eyes), **dyspnoea**, and **cough**^Q.
- Other symptoms include hoarseness, tongue swelling, headache, nasal congestion, epistaxis, dysphagia, pain, dizziness, syncope.
- Characteristic physical findings are **dilated neck veins, increased number of collateral veins covering the anterior chest wall, cyanosis, and edema of the face, arms and chest**^Q.

Diagnosis

- Most significant chest radiographic finding is **widening of the superior mediastinum (MC right side)**^Q
- CT scan: Investigation of choice^Q.

Treatment

- Potentially life threatening complication of **superior mediastinal mass** is **tracheal obstruction**^Q.
- Diuretics with low salt diet, head elevation and oxygen may produce temporary symptomatic relief.

Treatment	Underlying cause
Radiation Therapy ^Q	Non-small cell lung cancer, Metastatic solid tumors
Chemotherapy ^Q	Small cell carcinoma or lymphoma
Surgery ^Q	All other cases

115. Ans. b. Small cell carcinoma

116. Ans. a. Cytokeratin (Ref: Fishman Pulmonary Disease 4th/848)

- Cytokeratin positivity is seen in **almost all NSCLC** (Non small cell carcinoma lung) due to their **epithelial origin**.
- Chromogranin and synaptophysin positivity is seen in **small cell carcinoma**.

117. Ans. d. Secretion of PTH-related peptic

118. Ans. c. Non-small cell lung carcinoma

119. Ans. b. Adrenal

120. Ans. a. Adenocarcinoma most common, d. Oat cell (Neuroendocrine cells)

121. Ans. a. Clara cells, c. Mucin secreting cells, d. Type II pneumocytes (Ref: Robbins 8/e p725)

BRONCHIOALVEOLAR CARCINOMA (BAC)

- BAC occurs in the **pulmonary parenchyma** in the **terminal bronchioalveolar regions**^Q.

Histologically

- Characterized by a **pure bronchioalveolar growth pattern** with **no evidence of stromal, vascular, or pleural invasion**^Q.
- **Key feature: Growth along preexisting structures**^Q without destruction of alveolar architecture. This growth pattern has been termed "lepidic", and allusion to the neoplastic cells resembling butterflies sitting on a fence.

Two subtypes

- **Nonmucinous:** Columnar, **peg-shaped**, or cuboidal cells
- **Mucinous:** Distinctive, **tall, columnar cells** with cytoplasmic and **intra-alveolar mucin**, growing along the alveolar septa.

Ultra-structurally

- BAC are a heterogeneous group, consisting of **mucin-secreting bronchiolar cells**^Q, **Clara cells**^Q, or, rarely, **type II pneumocytes**^Q

122. Ans. d. Pancoast syndrome (Ref: Harrison 18/e p742; Sabiston 19/e p1582; Schwartz 10/e p623, 641-642, 9/e p534, 544-545; Bailey 26/e p859, 25/e p885; Devita 9/e p2136)

PANCOAST TUMOR (SUPERIOR SULCUS TUMOR)

- Pancoast's (or superior sulcus tumor) syndrome results from **local extension of a tumor growing in the apex of the lung** with involvement of **eighth cervical and 1st and 2nd thoracic nerves**, with **shoulder pain** characteristically radiates in the **ulnar distribution of the arm**, often with **radiologic destruction of 1st and 2nd ribs**^Q.
- Often **Horner's syndrome** and Pancoast's syndrome co-exist

Treatment

- **Preoperative RT** followed by **En bloc resection** of lung and **chest wall** with consideration of **postoperative RT** or **intra-operative brachytherapy**^Q.

123. Ans. c. Small cell carcinoma

124. Ans. None > c. Surgery (Ref: Sabiston 19/e p1582)

Best treatment is induction chemoradiotherapy followed by surgery.

125. Ans. c. Squamous cell carcinoma

Squamous Cell Carcinoma	
<ul style="list-style-type: none"> • MC in smokers, MC type in India^Q • MC variety associated with hypercalcemia^Q (produces PTH-rp) • Pancoast tumor is histologically SCC^Q 	<ul style="list-style-type: none"> • Central in distribution and prone to undergo central necrosis and cavitation^Q • Associated with best prognosis^Q

126. Ans. c. Left recurrent laryngeal nerve

127. Ans. d. Myasthenia gravis

128. Ans. a. Liver + Bones

129. Ans. d. Gastroparesis due to vagal involvement

130. Ans. b. Carcinoma bronchus (Ref: www.ncbi.nlm.nih.gov ... p.63(Suppl 1); Jul 2011)**TEMPORAL BONE METASTASIS**

- Metastatic tumors to the temporal bone are **uncommon**
- Usually seeded by the **hematogenous route**
 - MC metastatic lesion in the temporal bone: **CA Breast^Q**
- Lung, prostate and renal carcinomas are all well documented for their metastatic potential to the temporal bone^Q.

131. Ans. c. Small cell carcinoma

132. Ans. b. Adenocarcinoma

Adenocarcinoma

- MC histological **type**, MC in **non-smokers, young patients, females^Q**
- Located **peripherally** with slow growth and propensity to **metastasize** to **opposite lung^Q**
- **Metastasize** more frequently to **CNS**
- Most cells contain **mucin^Q**
- **Noguchi classification** is used for **adenocarcinoma^Q**

133. Ans. a. Variant of large cell anaplastic carcinoma

134. Ans. c. Hemoptysis

135. Ans. a. Malignant pleural effusion

136. Ans. c. Pancoast tumour

137. Ans. c. Cough

138. Ans. b. Ligate pulmonary artery (Ref: [Bailey 25/e p890](#))**PNEUMONECTOMY**

- Pneumonectomy is anatomically **more straightforward than lobectomy** (in carcinoma bronchus):
- The **pulmonary artery** is **first dissected, divided and sutured^Q**.
- The **pulmonary veins** are then isolated, **divided and sutured**.
- The **main bronchus** is **divided** so that no blind stump remains. The technique of **stump closure** is important if a bronchopleural fistula is to be avoided. The tissues are carefully handled and the **stump** is **usually stapled**.

139. Ans. b. Non-small cell carcinoma

140. Ans. a. Lung

141. Ans. a. Cough

142. Ans. a. Carcinoma lung

143. Ans. a. Bronchoscopy

144. Ans. b. Bronchoscopy and biopsy

145. Ans. a. Bronchoscopy, lavage and brushing (Ref: [Bailey 26/e p862, 25/e p883](#))**Uses of Bronchoscopy**

Diagnostic	Confirmation of disease:
	<ul style="list-style-type: none"> • Carcinoma of the bronchus^Q • Inflammatory and Infective process
Investigative	Tissue biopsy ^Q
Preoperative assessment	<ul style="list-style-type: none"> • Before lung resection^Q • Before esophageal resection • Persistent hemoptysis^Q
Therapeutic	<ul style="list-style-type: none"> • Removal of secretions • Removal of foreign bodies^Q • Stent placement, endobronchial resection

PULMONARY EMBOLISM146. Ans. d. Progesterone therapy (Ref: [Harrison 18/e p2170-2177](#); [Sabiston 19/e p295-297](#); [Schwartz 10/e p924-925, 9/e p787-789](#); [Bailey 26/e p917, 25/e p939](#))

- Estrogen, not the progesterone therapy predisposes to thrombosis and pulmonary embolism.

PULMONARY EMBOLISM

- Risk factors for pulmonary embolism are the **risk factors for thrombi formation** within **venous circulation**.
- Calf venous thrombosis: **Low risk for embolism**
- MC form of thromboembolic disease
- Thrombosis of larger veins: **High risk for embolism** (due to loosely attached thrombus to venous wall)

- MC site for DVT: **Calf veins^Q**
- MC source for pulmonary emboli: **Proximal vein of lower extremity^Q** (femoro-popliteal and iliac vein)

Risk Factors for Pulmonary Thromboembolism

- | | |
|--|---|
| <ul style="list-style-type: none"> • Age (Increasing age)^Q • Obesity^Q • Immobility (bed rest >4 days)^Q • Pregnancy^Q and Puerperium^Q • High dose estrogen therapy^Q • Surgery/trauma (especially of pelvis, hip or lower limb)^Q • Malignancy (especially pelvis, abdominal, metastatic) | <ul style="list-style-type: none"> • Heart failure/Recent MI^Q • Nephrotic syndrome^Q • Inflammatory bowel disease^Q • Polycythemia^Q • PNHQ or Lupus anticoagulant • Behcet's syndrome^Q • Homocystinuria^Q • Paralysis of lower limb • Varicose veins, Infection |
|--|---|

- ❖ Clinical features
- ❖ **Most** (60–80%) are **clinically silent** because they are **small** and there is **dual circulation** in **lungs**.
- ❖ Symptoms: Dyspnea (MC)^Q, chest pain, hemoptysis and cough
- ❖ Signs: Tachypnea (MC)^Q, fever, unilateral leg swelling, wheeze, pleural friction rub
- ❖ More than **60% obstruction** occurs in **pulmonary circulation** leading to sudden death, COR pulmonale or cardiovascular collapse.
- ❖ Multiple emboli over time may cause pulmonary hypertension and right ventricular failure.
- ❖ Paradoxical embolus can pass through an inter-atrial or inter ventricular defect. There by entering the systemic circulation.

- Any patient with **high likelihood** of pulmonary embolism on clinical evaluation **straightaway undergoes imaging tests**, while a patient with **low clinical likelihood** should **first undergo D-dimer test**.

Factors for Clinical Assessment of Pulmonary Embolism

- | | |
|---|--|
| <ul style="list-style-type: none"> • Clinical signs and symptoms of DVT^Q • An alternative diagnosis is less likely than pulmonary embolism • Heart rate >100/min^Q • Hemoptysis^Q | <ul style="list-style-type: none"> • Immobilization or previous surgery in 4 weeks^Q • Previous DVT/PE^Q • Malignancy^Q (on treatment, treatment in past 6 months) |
|---|--|

ECG Changes in Pulmonary Embolism
(Sinus tachycardia: MC and non-specific finding on ECG^Q)

- | Features of Acute Right Heart Strain | Highly predictive of PE |
|---|--|
| <ul style="list-style-type: none"> • Acute right axis deviation • P pulmonale • Right bundle branch block • Inverted T waves • ST segment change | <ul style="list-style-type: none"> • S₁Q₃T₃^Q: Seen in <12% patients <ul style="list-style-type: none"> – S wave in lead I – Q wave in lead III – Inverted T wave in lead III – S wave in lead I, II, and III (S₁S₂S₃) |

- ❖ Diagnosis
- ❖ D-dimer: Excellent screening test for the diagnosis of PE^Q.
- ❖ Best investigation in clinical suspicion of PE: Multidetector CT^Q
- ❖ Lung scanning is now a 2nd line diagnostic test for PE.
- ❖ Pulmonary angiography: Gold standard for diagnosis of PE^Q (but expensive and cumbersome)

147. Ans. c. Sinus tachycardia

148. Ans. a. Dyspnea

149. Ans. a. Pulmonary thromboembolism

150. Ans. b. Pulmonary angiography

151. Ans. c. End-tidal CO₂

CAPNOGRAPHY

- It is the **continuous measurement** of end tidal CO₂ and its waveforms.
- It works on the **principle** that **infrared light** is absorbed by CO₂.
- Useful in **diagnosing pulmonary embolism** by **air, fat or thrombus** (sudden fall in End-tidal CO₂ occurs). It may become zero if the embolus is large enough to block pulmonary circulation^Q.

152. Ans. c. Gas embolism

153. Ans. d. Virchow sign

154. Ans. a. Filling defect of main pulmonary artery, c. Lobar and segmental oligemia, d. Pleural effusion, e. Peripheral, wedge-shaped consolidations (Ref: Harrison 18/e p2174; Danhart Radiology 5th/51; Bhadury radiology 2nd/32)

- Harrison says "A **definitive diagnosis of PE** depends on **visualization of an intraluminal filling defect in more than one projection**. Secondary signs of PE include **abrupt occlusion ("cut-off") of vessels**, **segmental oligemia or avascularity**, a **prolonged arterial phase with slow filling**, and **tortuous, tapering peripheral vessels**."

CT-Angiographic Findings of Pulmonary Embolism	
<ul style="list-style-type: none"> Intraluminal filling defect in pulmonary artery (most specific finding^Q) Expanded unopacified vessel^Q Eccentric filling defects^Q Peripheral wedge shaped consolidation 	<ul style="list-style-type: none"> Oligemia^Q Pleural effusion^Q Abrupt cut-off^Q of pulmonary artery Tapering peripheral vessel^Q

155. Ans. a. Fat embolism (Ref: Apley's 8/e p 535-536, Rockwood 6th/553)

FAT EMBOLISM SYNDROME

Pathophysiology

- Fat embolism is a common phenomenon, more commonly seen in **multiple fracture and in fractures involving lower limbs especially femur**.
- Circulating **fat globules >10 micron^Q** in diameter occur in most adults after **close fracture of long bones**^Q and histological traces of fat can be found in the lungs and other internal organs.

Clinical presentation

- Usually manifests itself **within 24-48 hours**^Q.
- Early **warning signs** (within 72 hours of injury): Slight rise in temperature (**pyrexia**) and pulse rate (**tachycardia**)^Q

- In more pronounced cases there is **breathlessness**, mild mental confusion or restlessness, **petechiae on chest, axillae, retina and conjunctival folds**^Q; progressive to **marked respiratory distress** and coma in severe cases.

Diagnosis

- In addition to the classic clinical features, signs of **retinal artery emboli** (Striate hemorrhage and exudates^Q) may be present.
- Sputum and urine**: Presence of fat globules^Q.
- Chest X-ray: **Patchy pulmonary infiltration** (Snow storm appearance)^Q

Laboratory Tests	
No characteristic laboratory test, suggestive findings are:	
<ul style="list-style-type: none"> Thrombocytopenia^Q (platelets <1.5 lacks) PO₂ <60 mm Hg^Q 	<ul style="list-style-type: none"> Tachycardia^Q Pyrexia^Q Fall in hemoglobin value^Q

Management

- Supportive pulmonary care, definitive fracture management and effective treatment of shock** are the **corner stones** of current fat embolism management.

Respiratory support	Treatment of shock	Fracture stabilization
<ul style="list-style-type: none"> Ranges from oxygen administration to full respiratory support with mechanical ventilation Oxygen is the only therapeutic tool of proven use^Q 	<ul style="list-style-type: none"> Maintain adequate intravascular volume Aggressive fluid resuscitation Appropriate CVP monitoring to avoid fluid overload. Albumin for fluid resuscitation along with a balanced electrolyte solution because it not only restores blood volume but also binds free fatty acids. 	<ul style="list-style-type: none"> Maintain adequate intravascular volume Since movement at the fracture site has been shown to increase the fat emboli in circulation, early immobilization of lower extremity fractures^Q is advocated

Additional Therapies

- | | |
|---|--|
| <ul style="list-style-type: none"> Steroids: Prophylactic corticosteroids benefit high risk patients Heparin: Increase serum lipase activity and decrease number of circulating fat globules Hypertonic glucose: Metabolically decrease production of free fatty acids | <ul style="list-style-type: none"> Dextran^Q: To reduce red cell aggregation, expand plasma volume, decrease blood viscosity and reduce platelet adherence Aprotinin: Decrease platelet aggregation and serotonin release Alcohol: Reduces serum lipase activity |
|---|--|

156. Ans. c. CECT

158. Ans. a. Chest pain is the most common symptom

157. Ans. a. Pulmonary thromboembolism

159. Ans. c. Large veins of leg

160. Ans. a. Lung ventilation-perfusion scan

161. Ans. a. Pulmonary arteriography

162. Ans. a. Thrombolytic therapy (Ref: Harrison 18/e p2174; Sabiston 19/e p297; Schwartz 10/e p924-925, 9/e p787-789; Bailey 26/e p917, 25/e p939)

TREATMENT OF PULMONARY EMBOLUS

- Most pulmonary emboli can be treated by anticoagulation and observation
- Severe right heart strain and shortness of breath indicates the need for fibrinolytic treatment^Q.

- Thrombolysis (or embolectomy) is treatment of choice in massive PE or high risk (hypotension ± Right ventricular dysfunction)^Q

Prophylaxis Against Pulmonary Embolism

- In patients who are considered at high risk of embolism or when anticoagulants are contraindicated, a vena cava filter may be inserted to prevent the onward passage of any emboli.
- Filters can also be placed in patients who continue to have pulmonary emboli despite adequate anticoagulation^Q.
- Greenfield filter: Most commonly used^Q

163. Ans. a. Risk of hemorrhage

164. Ans. b. Negligible size of emboli

165. Ans. a. Pulmonary embolism

166. Ans. c. Dyspnea, pain, hemoptysis

167. Ans. d. Left upper lobe

168. Ans. b. Fat embolism

THORACIC INJURY

169. Ans. a. Electrolyte imbalance, b. Lymphopenia, c. Dehydration, e. Chylothorax may be present (Ref: Sabiston 19/e p1598; Schwartz 10/e p177-179, 200-203, 9/e p580-582; Bailey 26/e p702, 25/e p958; CSDT 12th/226)

THORACIC DUCT INJURY

- Causes: Iatrogenic trauma^Q (MC), penetrating and blunt trauma
- Iatrogenic chylothorax is a well-known complication of thoracic operations^Q

Clinical presentation

- Most of the patient presents with chylothorax
- In iatrogenic injuries, chylous fluid coming from drain site

Complications of Thoracic Duct Injury

- | | |
|---|--|
| <ul style="list-style-type: none"> • Dehydration^Q • Electrolyte losses^Q • Loss of fat and fat-soluble vitamins^Q | <ul style="list-style-type: none"> • Protein loss^Q • Impaired immunity^Q secondary to loss of circulating lymphocytes (lymphopenia^Q) |
|---|--|

Management

- Conservative management: Low-fat diet with medium chain triglycerides^Q, TPN, correction of electrolyte imbalance and adequate drainage by chest tube or neck drain^Q
- Octreotide and recently, Etilefrine (an adrenergic agent that acts by causing smooth muscle contraction of the thoracic duct) are effective^Q.

- Iatrogenic thoracic duct injury shows higher rate of spontaneous closure with conservative treatment^Q than traumatic injury.

- Surgery: Surgery is indicated after 5 days of conservative treatment, if chyle loss exceeds 1500 ml or if leak persist after 2 weeks^Q.

- VATS guided thoracic duct ligation is surgical treatment of choice^Q.

Poirier's Triangle

- Thoracic duct is readily identified within the confines of Poirier's triangle^Q via left posterolateral thoracotomy.
- Boundaries: Arch of aorta, Left subclavian artery and Vertebral column
- The thoracic duct traverses the triangle on esophagus that forms the floor of the triangle.

170. Ans. a. ECG done in all cases associated with sternal fracture, b. Under water seal drainage if associated with pneumothorax, c. X-ray chest investigation of choice (Ref: Bailey 26/e p353-355, 25/e p341-345)

CHEST TRAUMA

- Sternal fracture also constitute a marker for serious associated injuries, including myocardial contusion, myocardial rupture, esophageal perforation, airway injuries and thoracic aortic rupture.
- In blunt cardiac injuries, ECG is the first diagnostic test^Q.
- Routine investigation in the emergency department of injury to the chest is based on clinical examination, supplemented by chest radiography.
- In the unstable patient, chest radiography is the investigation of first choice^Q, provided that it does not interfere with resuscitation.

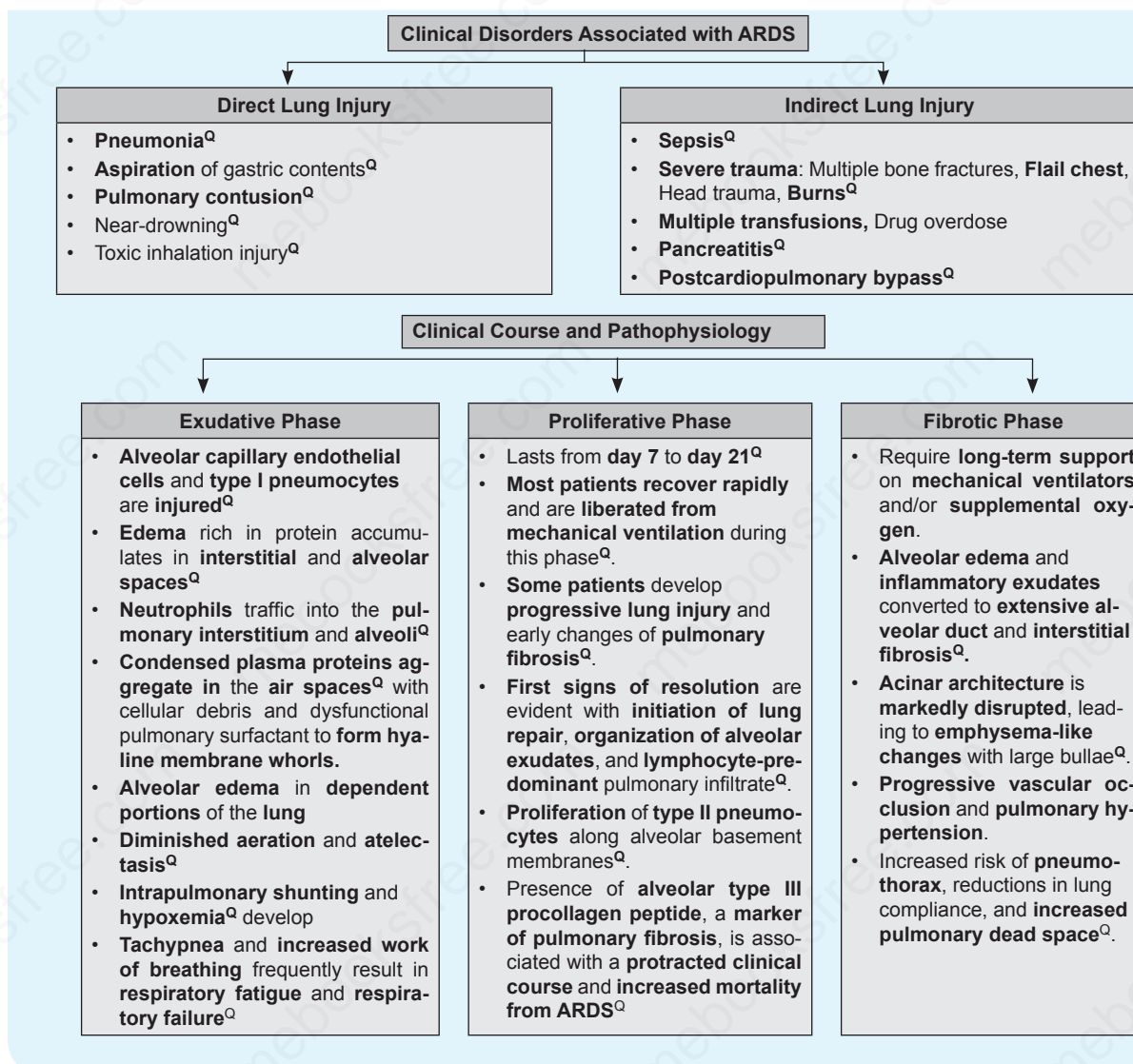
171. Ans. d. All

ADULT RESPIRATORY DISTRESS SYNDROME

172. Ans. a. Hypoxemia (Ref: Harrison 18/e p2205-2207; Sabiston 19/e p578)

ACUTE RESPIRATORY DISTRESS SYNDROME

- ARDS is a clinical syndrome of **severe dyspnea of rapid onset, hypoxemia, and diffuse pulmonary infiltrates** leading to **respiratory failure**^Q.
- ARDS is caused by **diffuse lung injury** from many underlying medical and surgical disorders.
 - Diffuse alveolar damage** is the **most characteristic feature of ARDS**^Q.



173. Ans. a. 6 mL/Kg (Ref: Harrison 18/e p2207)

MANAGEMENT OF ARDS

- A large-scale, randomized controlled trial sponsored by the National Institutes of Health and conducted by the ARDS Network compared **low VT (6 mL/kg^Q predicted body weight)** ventilation to conventional VT (12 mL/kg predicted body weight) ventilation.
- Mortality was significantly lower in the low VT patients (31%)** compared to the conventional VT patients (40%).
- This improvement in survival represents the **most substantial benefit in ARDS mortality**^Q demonstrated for any therapeutic intervention in ARDS to date.

174. Ans. a. PCWP >18 mm Hg (Ref: Harrison 18/e p2205)

Diagnostic Criteria	Acute Lung Injury (ALI)	ARDS
PaO ₂ /FiO ₂	• ≤300 mm Hg ^Q	• ≤200 mm Hg ^Q
Onset	• Acute ^Q	• Acute ^Q
Chest X-ray	• Bilateral alveolar or interstitial infiltrates ^Q	• Bilateral alveolar or interstitial infiltrates ^Q
Absence of Left Atrial Hypertension	• PCWP ≤18 mm Hg ^Q • No clinical evidence of increased left atrial pressure ^Q	• PCWP ≤18 mm Hg ^Q • No clinical evidence of increased left atrial pressure ^Q

175. Ans. a. Diffuse alveolar damage

177. Ans. d. PaO₂/FiO₂ <200 mm of Hg

179. Ans. d. Hypercapnia

182. Ans. a. PaO₂/FiO₂ <200 mm Hg

180. Ans. d. Hypercapnia

176. Ans. d. All of the above

178. Ans. c. Hypercapnia

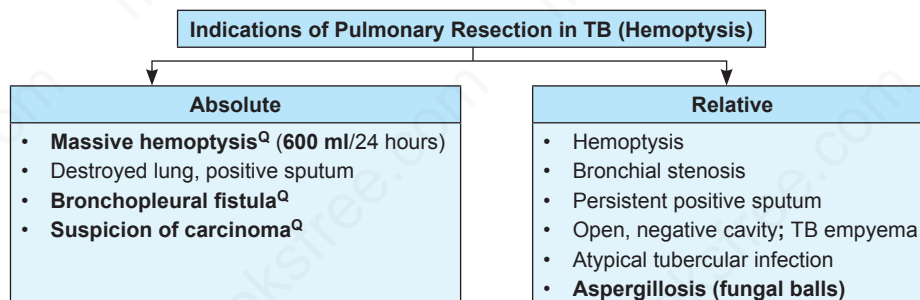
181. Ans. c. Increased left atrial pressure

PULMONARY TUBERCULOSIS

183. Ans. b. Bronchial artery (Ref: Grainger Radiology 4th/609)

Brochial arteries are the major source of hemoptysis.

184. Ans. d. All of the above (Ref: Tuberculosis by William N. Rom/519; Harrison 18/e p1371-1373)



CARDIAC TUMORS

185. Ans. b. Myxoma (Ref: Harrison 18/e p1979)

MYXOMA

- MC type of primary cardiac tumor in all age groups: Myxoma^Q
- Occur at all ages, most commonly in 3rd to 6th decades, with a female predilection.
- Approximately 90% are sporadic
- Remainder are familial with autosomal dominant transmission (NAME and LAMB syndrome)

Pathology

- Myxomas are gelatinous structures, consist of myxoma cells embedded in a stroma rich in glycosaminoglycans.

- Most are solitary, are located in the atria (particularly the left atrium, where they usually arise from the interatrial septum in the vicinity of the fossa ovalis), and are often pedunculated on a fibrovascular stalk.

- In contrast to sporadic tumors, familial or syndromic tumors tend to occur in younger individuals, are often multiple, may be ventricular in location, and are more likely to recur after initial resection.

Clinical Features

- MC clinical presentation mimics that of mitral valve disease: either stenosis owing to tumor prolapse into the mitral orifice or regurgitation resulting from tumor-induced valvular trauma.
- A characteristic low-pitched sound, a "tumor plop," may be appreciated on auscultation during early or mid-diastole
- Constitutional signs and symptoms: Fever, weight loss, cachexia, malaise

Diagnosis

- 2-D transthoracic or transesophageal echocardiography is investigation of choice^Q.
- CT and MRI: Information regarding size, shape, composition and surface characteristics

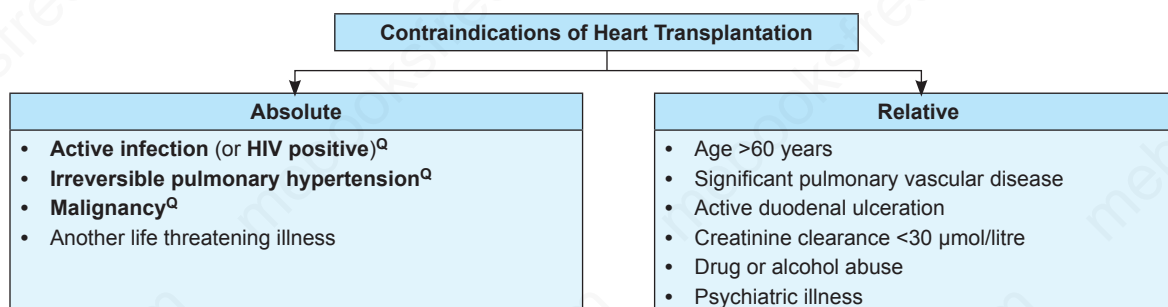
- Cardiac catheterization and angiography are **no longer considered mandatory**

Treatment

- Surgical excision utilizing cardiopulmonary bypass is **curative**^Q.
 - Recur in 12–22% of **familial** cases but in only 1–2% of sporadic cases.
- Tumor recurrence most likely is **due to multifocal lesions** in the **former** and **inadequate resection** in the **latter**^Q.

HEART TRANSPLANTATION

186. Ans. a. HIV infection, c. Irreversible pulmonary hypertension, e. Malignancy (Ref: Bailey 25/e p1428, 24/e p918; Harrison 18/e p1916)



PECTUS EXCAVATUM AND CARINATUM

187. Ans. a. Gross CVS dysfunction (Ref: Sabiston 19/e p1856; Bailey 26/e p872, 25/e p895)

PECTUS EXCAVATUM

- Pectus excavatum (also called funnel chest) is the MC chest wall deformity^Q
- Incidence: 1 of 400 children.
- More common in males
- Arises from excessive growth of the lower costal cartilages, causing posterior sternal depression^Q.

Clinical Features

- Most patients are asymptomatic at the time of presentation
- Decrease in respiratory reserve^Q or pain along the costal cartilages with exercise.

Diagnosis

- PFT: Evaluation of baseline pulmonary function^Q
- ECHO: Cardiovascular assessment

- In severe cases, decreased stroke volume and cardiac output with a restrictive pattern (decreased maximal breathing capacity) on PFT^Q.

Treatment

- Early repair with best results between 2–8 years of age.

Indications for operative intervention	
<ul style="list-style-type: none"> Cosmesis^Q Psychosocial factors^Q 	<ul style="list-style-type: none"> Presence of respiratory or cardiovascular insufficiency^Q

MISCELLANEOUS

188. Ans. d. To prevent progress of native blood vessel disease (Ref: Sabiston 19/e p1667–1668)

- A successful CABG reduces symptoms, prevents catastrophies and prolongs survival.
- It does not prevent progress of native blood vessel disease. Infact Restenosis of the grafted vessel is noted with the time.

189. Ans. a. Coarctation of aorta

Valvoplasty is done in valvular disease like MS, MR, AS or AR. It is not done in coarctation of aorta.

190. Ans. d. Endoscopic suction (Ref: Sabiston 19/e p292-293)

Endoscopic suction is not used in post-operative lung collapse.

POST-OPERATIVE LUNG COLLAPSE (ATELECTASIS)

- MC postoperative respiratory complication: Atelectasis^Q

- As a result of the anesthetic, abdominal incision, and postoperative narcotics, the alveoli in the periphery collapse and a pulmonary shunt may occur.
- Aggressive pulmonary toilet to prevent buildup of secretions and secondary infection. High risk in heavy smokers, obese patients^Q

Clinical Features

- MC cause of a postoperative fever in the first 48 hours: Atelectasis^Q
- Symptoms: Low-grade fever, malaise and diminished breath sounds in the lower lung fields.

Management

- Prevention of atelectasis: Pain control, deep breaths (spirometry) and cough^Q
- Rarely, intermittent positive pressure breathing and chest physiotherapy may be required.
 - Encouraging the patient to breathe deeply and cough is the single most valuable management approach in preventing and resolving atelectasis and pneumonia^Q.
- Pneumonia: Managed with aggressive pulmonary toilet, induced sputum for culture and sensitivity testing, IV antibiotic therapy.

191. Ans. a. It is a development defect, c. Defect is usually muscular (Ref: www.ncbi.nlm.nih.gov › ... Lung India › v.26(2); Apr-Jun 2009 by AP Kansal)

EVENTRATION OF THE DIAPHRAGM

- Abnormally elevated position of diaphragm from paralysis or atrophy of the muscle fibers.
- May be congenital anomaly^Q caused by failure of muscularization^Q of the dome of hemidiaphragm, or it may be acquired as a result of dysfunction of the phrenic nerve related to the neuromuscular disease or trauma including operative trauma.
- Birth trauma: MC cause of acquired diaphragmatic eventration, usually related to breech presentation.

- Most commonly diagnosed in pediatric patients^Q
- More common in males and affect left hemidiaphragm more frequently.

Treatment

- Diaphragmatic plication is preferred over resection^Q.
- Surgery to fix the diaphragm in inspiration^Q so the paradoxical movement and mediastinal shift are minimized.

192. Ans. a. Calcified lymph nodes eroding into bronchus (Ref: www.ncbi.nlm.nih.gov/pubmed/12376611)

BRONCHOLITHIASIS

- Calcified or ossified material is present within the bronchial lumen^Q
- Radiographic findings: Airway obstruction^Q such as atelectasis, mucoid impaction, bronchiectasis, and expiratory air trapping.
- Broncholithiasis is strongly suggested at CT (when an endobronchial or peribronchial calcified nodule is associated with bronchial obstruction)

193. Ans. b. Emphysema

194. Ans. b. Lobectomies

195. Ans. d. Elevated pulmonary artery pressure

196. Ans. b. Abram's (Ref: Bailey 26/e p856, 25/e p881)

NEEDLES FOR PLEURAL BIOPSY

- Abrams' needle
- Cope's needle

197. Ans. a. Pneumothorax (Ref: thorax.bmj.com › Volume 58, Issue suppl 2)

HEIMLICH VALVE

- Heimlich chest drain valve is a specially designed flutter valve used to replace underwater bottles in chest drainage.
- The valve allows unidirectional flow^Q.
- In clinical situations like spontaneous pneumothorax, open thoracotomy, recurrent pleural effusion^Q, chest drainage can be simplified with Heimlich chest drain valve.

198. Ans. b. Histoplasma (Ref: Sabiston 19/e p1587; Schwartz 10/e p679-680, 9/e p577)

The organism most frequently related to mediastinal fibrosis is Histoplasma.

CHRONIC (FIBROSING) MEDIASTITIS

- The spectrum of chronic mediastinitis ranges from **granulomatous inflammation** of the **lymph nodes** in the mediastinum to **fibrosing mediastinitis**.
- Most cases are due to **TB** or **histoplasmosis**^Q, but sarcoidosis, silicosis, and other fungal diseases are at times causative.

Clinical Features

- Patients are **usually asymptomatic**.
- Those with fibrosing mediastinitis usually have **signs of compression** of some **mediastinal structure** such as the **SVC** or **large airways**, **phrenic** or **RLN** paralysis, or obstruction of the pulmonary artery or proximal pulmonary veins.

Treatment

- Other than **ATT** for **tuberculous mediastinitis**, **no medical or surgical therapy** has been demonstrated to be **effective** for **mediastinal fibrosis**^Q.

199. Ans. d. More common in lower lobes

200. Ans. d. Mediastinum

201. Ans. c. Lateral thoracotomy (Ref: Bailey 25/e p888)

The standard route into thoracic cavity is through a posterolateral thoracotomy.

202. Ans. d. Lateral border of 12th rib (Ref: BDC 4th/vol-I/220)

Level of ↓		
	Inferior margin of pleural reflection	Lung lower border (Pleural level-2)
Mid-clavicular line	8 th rib ^Q	6 th rib ^Q
Mid-axillary line	10 th rib ^Q	8 th rib ^Q
Posterior axillary line (Lateral border of sacrospinalis/erector spinae)	12 th rib ^Q	10 th rib ^Q

203. Ans. a. Hemoptysis (Ref: Bailey 26/e p869, 25/e p893)

BRONCHIECTASIS

- Chronic irreversible dilatation of the **medium-sized bronchi**^Q, which may occur following a suppurative pneumonia or bronchial obstruction.

- If generalized it is almost never considered for surgical resection^Q.

Treatment

- Removal of the **bronchiectatic** part of the lung for symptoms of **bleeding**^Q, **recurrent infection**^Q or **copious symptoms**^Q can be very effective when the disease is localized.

204. Ans. c. Ventriculectomy

Bentall's operation	For aortic root aneurysm repair Reimplantation of coronary ostia into composite graft
Bastio surgery	For Left ventricular hypertrophy Ventriculectomy is done ^Q

205. Ans. a. -2 to -6 mm Hg

206. Ans. d. Laryngotracheal stenosis (Ref: Dhillon 3rd/67)

- Topical Mitomycin C is the drug of choice used to aid the treatment of **laryngeal stenosis**^Q.
- Topical Mitomycin C can **inhibit fibroblast activity** and **restenosis**^Q.

207. Ans. c. Round atelectasis (Ref: Thoracic Imaging by Golanski (Thieme) 2010/Atelectasis/Chapter 2)

ROUND ATELECTASIS

- Rounded subpleural opacity**, most commonly in **lower lobes**^Q
- Comet tail sign** positive^Q
- Typical history of **asbestos exposure**^Q is often present

208. Ans. b. Saphenous vein (Ref: Bailey 26/e p828)

Saphenous vein are the most commonly employed conduits in coronary vascularization.

209. Ans. c. FEV1 >2L, Normal DLCO (Ref: Bailey 26/e p851-852)

PULMONARY FUNCTION TEST

- Pulmonary function studies are routinely performed when any resection greater than a wedge resection will be performed.
- Of all the measurements available, the **two most valuable are FEV1 and DLCO**.
- For every 10% decline in patients DLCO, the risk of any pulmonary complications (As estimated by odd ratio) increased by 42%.
- Patients with FEV1 >2.0 L can tolerate pneumonectomy, and those with an FEV1 of >1.5 L can tolerate lobectomy.

210. Ans. c. CT chest is the first investigation done (Ref: Harrison 18/e p285; Sabiston 19/e p1589)

- "Massive hemoptysis may be defined as greater than 500 to 600 mL of blood loss from the lungs in 24 hours." - Sabiston 19/e p1589
- "Massive hemoptysis is one of the most dreaded of all respiratory emergencies and can have a variety of underlying causes. In 90% of cases, the source of massive hemoptysis is the bronchial circulation."
- "For most patients, the next step in evaluation of hemoptysis should be a standard chest radiograph. If a source of bleeding is not identified on plain film, a CT of the chest should be obtained." - Harrison 18/e p285
- "If all of these studies are unrevealing, bronchoscopy should be considered. Rigid bronchoscopy with an 8.5-mm or larger bronchoscope is needed." - Harrison 18/e p285
- "As most large-volume hemoptysis arises from an airway lesion, it is ideal if the site of the bleeding can be identified either by chest imaging or bronchoscopy (more commonly rigid than flexible)." - Harrison 18/e p285

MASSIVE HEMOPTYSIS

- Hemoptysis of >200-600 cc in 24 hours^Q
- Massive hemoptysis should be considered a medical emergency.

Diagnostic Evaluation

- For most patients, the next step in evaluation of hemoptysis should be a standard chest radiograph^Q.
- If a source of bleeding is not identified on plain film, a CT of the chest^Q should be obtained.

- If all of these studies are unrevealing, bronchoscopy should be considered.
- Rigid bronchoscopy with an 8.5 mm or larger bronchoscope is needed.

Treatment

- Large-volume, life-threatening hemoptysis generally requires immediate intervention regardless of the cause^Q.
- The first step is to establish a patent airway usually by endotracheal intubation and subsequent mechanical ventilation^Q.

- As most large-volume hemoptysis arises from an airway lesion, it is ideal if the site of the bleeding can be identified either by chest imaging or bronchoscopy (more commonly rigid than flexible)^Q.

- If the bleeding does not stop with therapies of the underlying cause and passage of time, severe hemoptysis from bronchial arteries can be treated with angiographic embolization of the culprit bronchial artery^Q.

211. Ans. a. Pneumomediastinum

SECTION 6

PLASTIC SURGERY

CHAPTERS

- ❖ Burns
- ❖ Plastic Surgery and Skin Lesions
- ❖ Wound Healing, Tissue Repair and Scar

MULTIPLE CHOICE QUESTIONS

BURNS: % BSA

- According to "rule of nines", burns involving perineum are:
 - 1%
 - 9% (MCI March 2009)
 - 18%
 - 27%
- A five years old child presents to the emergency department with burns. The burn area corresponding to the size of his palm is equal to: (All India 2011)
 - 1% BSA
 - 5% BSA
 - 10% BSA
 - 20%
- Head and neck involvement in burns in infant is: (PGI June 2000)
 - 9%
 - 18%
 - 27%
 - 32%
- An adult whose both lower limbs are charred along with genitalia has.....burns. (DPG 2010)
 - 18%
 - 19%
 - 36%
 - 37%
- In a 6 years old child with burns involving the whole of head and trunk, estimated body surface area of burns is: (COMEDK 2008)
 - 44%
 - 52%
 - 55%
 - 58%
- Rule of nine of estimate surface area of a burnt patient was introduced by: (AIIMS 84)
 - Mortix Kaposi
 - Alexander Wallace
 - Joseph Lister
 - Thomas Barclay
- Calculate the percentage of burns on the head, neck and face in a child of one year: (All India 88)
 - 10%
 - 16%
 - 13%
 - 15%
- Best method to assess burns in 5 years old child caused by boiling water: (AIIMS May 2013)
 - Palm method
 - Rule of 9
 - Lund and Browder chart
 - Rule of one
- A child has circumferential burn of both of thighs and buttocks, face and scalp with singeing of hairs. Calculate the percentage of burns: (JIPMER 2014, AIIMS May 2013)
 - 24
 - 27
 - 37
 - 45
- Head and face burn in infant is: (Recent Questions 2014, 2013)
 - 15%
 - 18%
 - 12%
 - 32%

11. Percentage of burn in children is best assessed by?

- Rule of 9
- Rule of palm = 1%
- Lund and Browder chart
- Wallace rule (DNB 2014)

BURNS

- A burn patient is referred when: (PGI June 2004)
 - 10% superficial burn in child
 - Scald in face
 - 25% superficial burn in adult
 - 25% deep burn in adult
 - Burn in palm
- In burns heat loss is by/due to: (PGI 80, DPG 80, 92)
 - Dilatation of veins
 - Shock
 - Exposed area by evaporation
 - None of the above
- Metabolic derangements in severe burns are all except: (PGI June 2000)
 - ↑corticosteroid secretion
 - Hyperglycemia
 - ↑secretion of HCl
 - Neutrophil dysfunction
- Pus in burns form in: (PGI 79, DPG 89)
 - 2-3 days
 - 3-5 days
 - 2-3 weeks
 - 4 weeks
- Fever in burnt patient is caused by: (PGI Nov 2009, June 2009)
 - Septicemia
 - Due to hypermetabolism
 - Decreased sweating
 - Release of pyrogens from dead product
 - Dehydration
- True about thermal burn injury: (PGI June 2009)
 - Outermost layer is zone of stasis
 - Middle layer is zone of hyperemia
 - Inner layer is zone of coagulation
 - Hyperemia is due to vasodilatation
 - Zone of stasis is associated with vascular damage
- Undue restlessness in a patient during the immediate post burn period is often a manifestation of: (Karnataka 95)
 - Hypoxia
 - Hypovolemia
 - Hyperkalemia
 - Anxiety
- All require hospitalization except: (DNB 2002, All India 91)
 - 5% burns in children
 - 10% scalds in children
 - Electrocution
 - 15% deep burns in adults

20. True about burns: (PGI 2000)

- a. Hyperglycemia is seen in early burns
- b. Child with burns should have damp dressing
- c. Chemical powder burns should be kept dry
- d. 3rd degree burns are painfull

BURNS DEPTH**21. True regarding burns:** (PGI Dec 2007)

- a. Only 2nd and 3rd degree is considered in the classification
- b. 2nd degree-Epidermis + papillary dermis
- c. Blisters-2nd degree
- d. Curling ulcer can occur
- e. Classified according to depth of invasion

22. In a patient with the burn wound extending into the superficial epidermis without involving the dermis would present all of the following except: (SGPGI 2005)

- a. Healing of the wound spontaneously without scar formation
- b. Anesthesia at the site of burn
- c. Blister formation
- d. Painful

23. A third degree circumferential burn in the arm and forearm region, which of the following is most important for monitoring? (UPPG 2004)

- a. Blood gases
- b. Carboxy-oxygen level
- c. Macroglobinuria cryoglobulinuria
- d. Peripheral pulse and circulation

24. In 3rd degree burns, all are seen except: (PGI Dec 99, UPPG 2004)

- a. Vesicles are absent
- b. Painful
- c. Leathery skin
- d. Reddish due to Hb infiltration

25. True statement regarding 2nd degree deep burn: (PGI Dec 2008)

- a. Blanch on pressure
- b. Erythema
- c. Dry white colour
- d. Painless
- e. Predispose to hypothermia

26. Degree of burns in a patient with prominent vessels with decreased needle prick sensation and dryness:

- a. Superficial partial thickness burns
- b. Deep partial thickness burns (MHSSMCET 2006)
- c. Electric burns
- d. Full thickness burns

27. Burn involving epidermis and full thickness of dermis: (MHSSMCET 2008)

- a. First degree burns
- b. Partial-thickness second degree burns
- c. Full-thickness second degree burns
- d. Third degree burns

28. True about burn is: (UPPG 2010)

- a. Full thickness burn feels, leathery, painless
- b. Electric burn are superficial
- c. IV fluid formula used Curreri and Brooke
- d. Skin grafting done after 48 hours
- e. 1 year of age in head and neck region covers 18%

29. Which of the following is not seen in 3rd degree burns? (MCI March 2009)

- a. Loss of skin appendages
- b. No vesicles

- c. Red color
- d. Extremely painful

30. In second degree burns, re-epithelialisation occurs around:

- a. 1 week
- b. 2 weeks (MCI Sept 2009)
- c. 3 weeks
- d. 4 weeks

31. Which of the following is false regarding deep 2nd degree burns? (MCI Sept 2009)

- a. Heal by scar deposition
- b. Painless
- c. Damage to deeper dermis
- d. Less blanching

32. Superficial burns; true is/are: (PGI June 2001)

- a. Always requires skin grafting
- b. Dry and inelastic
- c. Blister formation
- d. Painless
- e. Can be healed within 7-10 days

33. Not a feature of deep burn is: (AIIMS Nov 93)

- a. Black charred skin
- b. White leathery skin
- c. Loss of pain sensation
- d. Blisters

34. Burns with vesiculation, destruction of the epidermis and upper dermis is: (PGI June 99)

- a. 1st degree
- b. 2nd degree
- c. 3rd degree
- d. 4th degree

35. Blisters are seen in which type of burns? (DNB 2009)

- a. Superficial first degree
- b. Superficial second degree
- c. Third degree
- d. Deep first degree

36. All may be seen in deep burns except: (All India 98)

- a. Hyperthermia
- b. Increase vascular permeability
- c. Fluid loss by evaporation
- d. Vasodilation

37. 2nd degree burns indicate involvement of: (JIPMER 2013)

- a. Epidermis
- b. Dermis
- c. Subcutaneous tissue
- d. Deep fascia

TREATMENT OF BURNS**38. Parkland formula is:** (JIPMER 2010)

- a. Percentage of burns \times weight (kg) \times 4 = volume in ml
- b. Percentage of burns \times weight (kg)/2 = 1 volume in ml
- c. Percentage of burns \times weight (kg) \times 9 = volume in ml
- d. 500 ml/m² BSA + 1500 ml/m² = volume in ml

39. IV formula for burn is: (Recent Question 2015, UPPG 2009)

- a. Total % body surface area \times weight \times 4 = volume in ml
- b. Total % body surface area \times weight \times 5 = volume in ml
- c. Total % body surface area \times weight \times 6 = volume in ml
- d. Total % body surface area \times weight \times 7 = volume in ml

40. Which of the following formula for fluid administration in a patient with burns is not correct? (MHSSMCET 2008)

- a. Parkland: 4 ml Kg/%TBSA burn of RL
- b. Brooks: 1.5 ml Kg/%TBSA burn of RL + 0.5ml kg % burn+2000 ml D5W
- c. Shrine: 5000 ml m² TBSA burn + 2000 ml m² TBSA
- d. Evans: 8ml Kg/% TBSA burn of RL

41. **Treatment of burns includes:** (PGI June 2008)
 a. No bandage to head and neck
 b. Immediate application of ice cold water
 c. Superficial burns without blister-no need of dressing
 d. Escharotomy done for peripheral circumscribed lesions
42. **The ideal temperature of water to cool the burnt surface is:**
 a. 15°C
 b. 10°C (UPSC 2002)
 c. 8°C
 d. 6°C
43. **What should be the ideal temperature of the cool water to be applied over burns?** (MHPGMCET 2006)
 a. Ice cold
 b. 3-4°C
 c. 8-10°C
 d. 14-15°C
44. **Safest strategy of treatment for a patient of inhalational burn injury who has presented within 4-5 hours:**
 a. Binasal catheter O₂ inhalation (MHPGMCET 2007)
 b. O₂ therapy with well-fitting face mask
 c. Elective cricothyroidotomy
 d. Elective endotracheal intubation
45. **In burns management, which of the following is the fluid of choice?** (Recent Question 2014, DNB 2012, 2005, MCI March 2010, Sept 2010)
 a. Dextrose 5%
 b. Normal saline
 c. Ringer lactate
 d. Isolyte-M
46. **A 50 kg female has second degree deep burn involving 45% total body surface area (TBSA). Regarding her management which of the following statement (s) is/are true:**
 a. Give rapid normal saline infusion (PGI Dec 2008)
 b. Half of the calculated fluid should be given in initial 8 hours
 c. 9 liters of Ringer's lactate should be given in first 24 hours
 d. Urine output should be maintained at 25-30 ml/hour
 e. CVP line should be inserted
47. **All of the following are true regarding fluid resuscitation in burn patients except:** (MCI March 2008)
 a. Consider intravenous resuscitation in children with burns greater than 15% TBSA
 b. Oral fluids must contain salts
 c. Most preferred fluid is Ringer's lactate
 d. Half of the calculated volume of fluid should be given in first 8 hours
48. **What is the most important aspect of management of burn injury in the first 24 hours?** (UPSC 2007)
 a. Fluid resuscitation
 b. Dressing
 c. Escharotomy
 d. Antibiotics
49. **In excessive burns, least useful is:** (AIIMS June 94)
 a. Blood
 b. Dextran
 c. Ringer lactate
 d. Nasogastric intubation
50. **True statement about burn resuscitation:** (PGI Dec 2003)
 a. Colloid preferred in initial 24 hours
 b. Colloid preferred if burnt area is >15% of total BSA
 c. Half of the calculated fluid given in initial 8 hours
 d. Urine output should be maintained at 50-60 mL/hour
 e. Diuretics should be given to all patients of electric burn
51. **Which of the following is true about burns?** (PGI Dec 2005)
 a. 3rd generation cephalosporin is drug of choice
 b. S. aureus is most common infection of burn
 c. Toxic shock syndrome is most common in burns patients
 d. Pseudomonas is most common infection in dry wound
 e. Moist dressing is done
52. **Which of the following is true about burn management?**
 a. Intravenous access fluid is done and antibiotics is not given in children (PGI Dec 2005)
 b. Escharotomy should be done for peripheral circumscribed lesion
 c. Moist dressing is done
 d. Parkland formula is used with 8ml/kg body weight
 e. Prognosis depend on the time of resuscitation of the patient
53. **Exposure treatment is done for burns of the:** (JIPMER 87)
 a. Upper limb
 b. Lower limbs
 c. Thorax
 d. Abdomen
 e. Head and neck
54. **Deep skin burn is treated with:** (AIIMS 91)
 a. Split thickness graft
 b. Full thickness graft
 c. Amniotic membrane
 d. Synthetic skin derivatives
55. **The cold water treatment of burns has the disadvantage that it increase the chances of:** (PGI 81, AIIMS 83)
 a. Pain
 b. Exudation
 c. Infection
 d. None of the above
56. **The best guide to adequate tissue perfusion in the fluid management of a patient with burns, is to ensure a minimum hourly urine output of:** (Karnataka 2004)
 a. 10-30 ml
 b. 30-50 ml
 c. 50-70 ml
 d. 70-100 ml
57. **Burns in which part of body are nursed without occlusive dressing?** (DPG 2005)
 a. Hands
 b. Legs
 c. Head and Neck
 d. Chest
58. **Which of the following is effected against Pseudomonas and is used in burns patients?** (DNB 2009)
 a. Silver sulphadiazine
 b. Silver sulphazine
 c. Sulphamethoxazole
 d. Sulphadoxine
59. **In children with burns, maintenance IV fluid normally given is ?** (MHCET 2006)
 a. Ringer lactate
 b. 5% dextrose
 c. Normal saline
 d. Dextrose saline

COMPLICATIONS OF BURNS

60. **Late deaths in burns is due to:** (PGI Dec 99)
 a. Sepsis
 b. Hypovolemia
 c. Contractures
 d. Neurogenic
61. **Most common cause of death due to burns in early period is:**
 a. Sepsis
 b. Hypovolemic shock
 c. Both
 d. None (APPG 2008)

62. Most common carcinoma after burns is: (DPG 2008)

- a. Squamous cell carcinoma b. Adenocarcinoma
- c. Melanoma d. Mucoïd carcinoma

63. Most common cause of death in burns is: (Punjab 2008)

- a. Primary shock b. Secondary shock
- c. Hemorrhagic shock d. Septicemic shock

64. Burns shock is: (Punjab 2011)

- a. Hypovolemic
- b. Neurogenic
- c. Endotoxic
- d. Cardiogenic

65. Which of the following statement(s) is/are true about post-burn neck contracture? (PGI June 2009)

- a. Occur because of conservative management of deep burn
- b. Treated by flaps
- c. Obliteration of cervicomenal angle
- d. Dental abnormalities may be present
- e. Never develop in deep dermal burn

66. Death from burns in first 10 days is due to all except:

- a. Shock b. Infection (DNB 2005)
- c. Renal failure d. Respiratory distress

MISCELLANEOUS

67. Domestic low-voltage electric supply can cause all the following except: (MHPGMCET 2007)

- a. Contact wound
- b. Cardiac arrest
- c. Cardiac fibrillation
- d. Deep subcutaneous tissue damage

68. Main danger with low tension (Domestic) electric AC current: (MHPGMCET 2009)

- a. Renal injury (ARF)
- b. Cardiac arrest
- c. Muscle necrosis
- d. Paralysis

69. Operation theatre fire is most commonly due to: (DNB 2010)

- a. Argon beam coagulators
- b. Lasers
- c. Fibre optic illumination
- d. Electrosurgical equipment

70. Myoglobinuria is seen in which type of burn? (DNB 2012)

- a. Flame burn b. Scald burn
- c. Electric burn d. Contact burn

EXPLANATIONS

BURNS: % BSA

1. Ans. a. 1% (Ref: Sabiston 19/e p523; Schwartz 10/e p227-236, 1820-1822, 19/e p199-200; Bailey 26/e p389, 25/e p381)

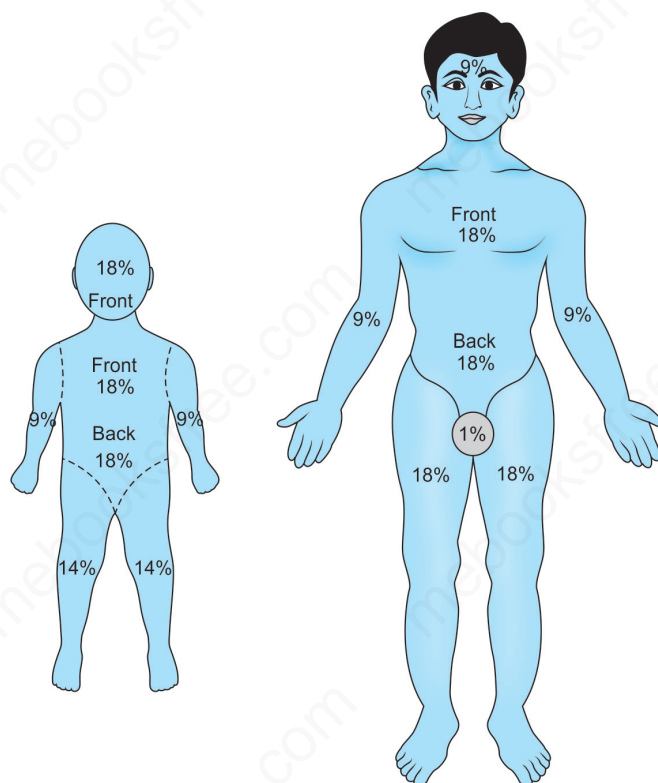
BURN SIZE (% BSA)

- Determination of burn size estimates the extent of injury.
- Burn size is assessed by **Wallace rule of nines** (By Alfred Russel Wallace^o)

Wallace Rule of Nines

- **In adults:**
 - Each **upper extremity**: 9%^o
 - **Head and neck**: 9%^o
 - **Lower extremities**: 18%^o
 - **Anterior and posterior aspects of the trunk**: 18%^o
 - **Perineum and genitalia**: 1%^o

- **Children** have a relatively **larger proportion** of body surface area in their **head and neck**, which is compensated for by a relatively smaller surface area in the lower extremities.
 - **In infants**: Head and neck- 21%^o ; Each leg- 13%^o
- **Berkow formula^o** is used to accurately determine burn size in children.
- For estimating smaller burns: **Area of open hand^o** (including palm and extended fingers) of the patient is approximately 1%^o of TBSA
- This method is helpful in **evaluating splash burns** and burns of **mixed distribution**.



Estimation of burn size using the rule of nine

2. Ans. a. 1% BSA

3. Ans. b. 18%

4. Ans. d. 37%

5. Ans. a. 44% (Ref: Sabiston 19/e p524)

Berkow Formula to Estimate Burn Size (%)			
Body Part	0-1 year	1-4 years	5-9 years
Head	19 ^a	17 ^a	13 ^a
Neck	2	2	2
Anterior trunk	13	13	13
Posterior trunk	13	13	13

6. Ans. b. Alexander Wallace

7. Ans. None

8. Ans. c. Lund and Browder chart (Ref: Schwartz 19/e p199-200)

"In children younger than 3 years old, the head accounts for a larger relative surface area and should be taken into account when estimating burn size. Diagrams such as the **Lund and Browder chart** give a **more accurate accounting of the true burn size in children.**" - Schwartz 19/e p199

"For children and infants, the Lund-Browder chart is used to assess the burned body surface area. Different percentages are used because the ratio of the combined surface area of the head and neck to the surface area of the limbs is typically larger in children than that of an adult." http://en.wikipedia.org/wiki/Total_body_surface_area

9. Ans. c. 37 (Ref: Sabiston 19/e p524)

10. Ans. b. 18% (Ref: Sabiston 19/e p524)

A Child Has

- Circumferential burn of both of thighs = $6.5 + 6.5 = 13$
- Buttocks = $2.5 + 2.5 = 5$
- Face and scalp with singeing of hairs = 17

Total burn = $13 + 5 + 17 = 35\%$

Berkow Diagram to Estimate Burn Size (%) Based on Area of Burn in an Isolated Body Part						
Body Part	0-1 yr	1-4 yr	5-9 yr	10-14 yr	15-18 yr	ADULT
Head	19	17	13	11	9	7
Neck	2	2	2	2	2	2
Anterior trunk	13	13	13	13	13	13
Posterior trunk	13	13	13	13	13	13
Right buttock	2.5	2.5	2.5	2.5	2.5	2.5
Left buttock	2.5	2.5	2.5	2.5	2.5	2.5
Genitalia	1	1	1	1	1	1
Right upper arm	4	4	4	4	4	4
Left upper arm	4	4	4	4	4	4
Right lower arm	3	3	3	3	3	3
Left lower arm	3	3	3	3	3	3
Right hand	2.5	2.5	2.5	2.5	2.5	2.5
Left hand	2.5	2.5	2.5	2.5	2.5	2.5
Right thigh	5.5	6.5	8	8.5	9	9.5
Left thigh	5.5	6.5	8	8.5	9	9.5
Right leg	5	5	5.5	6	6.5	7
Left leg	5	5	5.5	6	6.5	7
Right foot	3.5	3.5	3.5	3.5	3.5	3.5
Left foot	3.5	3.5	3.5	3.5	3.5	3.5

11. Ans. c. Lund and Browder chart

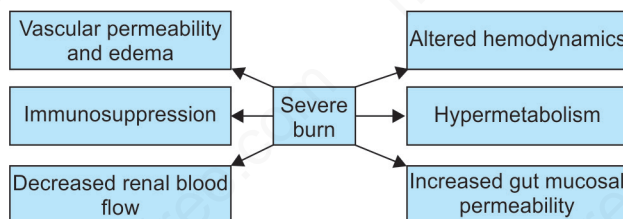
BURNS

12. Ans. a. 10% superficial burn in child; b. Scald in face; c. 25% superficial burn in adult; d. 25% deep burn in adult; e. Burn in palm
(Ref: Sabiston 19/e p521-522; Schwartz 10/e p227-236, 19/e p198; Bailey 26/e p388, 25/e p380-381)

PATIENTS WITH THE FOLLOWING CRITERIA ARE REFERRED TO A DESIGNATED BURN CENTER

- Partial-thickness burns >10% TBSA^Q
- Burns involving the face, hands, feet, genitalia, perineum, or major joints^Q
- Any full-thickness burn^Q
- Electrical burns, including lightning injury^Q
- Chemical burns^Q
- Inhalation injury^Q
- Burns in patients with preexisting medical disorders^Q that could complicate management, prolong recovery, or affect outcome
- Any patient with burns and concomitant trauma^Q (e.g., fractures) in which the burn injury poses the greater immediate risk for morbidity and mortality.
- Burned children in hospitals without qualified personnel or equipment to care for children
- Burns in patients who will require special social, emotional, or long-term rehabilitative intervention

13. Ans. c. Exposed area by evaporation (Ref: Sabiston 19/e p521-522; Schwartz 19/e p197-199; Bailey 26/e p386-387, 25/e p378-379)



PATHOPHYSIOLOGY OF BURNS

- Radiant heat loss is increased from the burn wound secondary to increased blood flow and integumentary loss^Q.
- Heat loss also occurs because of evaporation of water from the burn wounds^Q. This leads to significant fluid loss also.
 - Significant burns are associated with massive release of inflammatory mediators, both in wound and in other tissues.
 - These mediators produce vasoconstriction and vasodilatation, increased capillary permeability and edema locally and in distant organs.
- Immune System: Global depression in immune function (Depressed cellular function in all parts of the immune system, including activation and activity of neutrophils, macrophages, B and T lymphocytes).
- Metabolism: Increased release of catabolic hormones like catecholamines, corticosteroids and glucagon leads to hypermetabolic state^Q.
 - Stress ulcers (Curling ulcers^Q) of burns are due to decrease in mucosal defenses^Q (acid secretion is not increased^Q)

14. Ans. c. ↑secretion of HCl

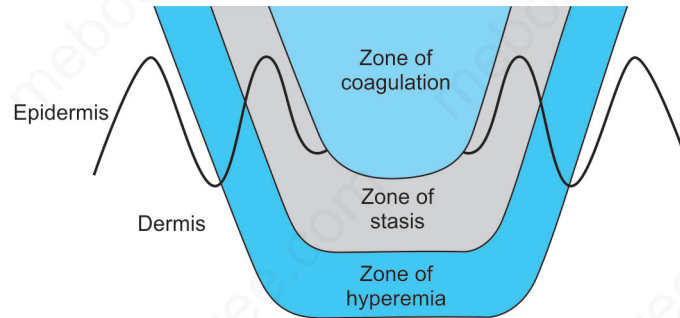
15. Ans. b. 3-5 days

16. Ans. a. Septicemia; b. Due to hypermetabolism (Ref: Total Burn Care by David N. Herndon 3/e p158; Sabiston 19/e p524-526; Schwartz 19/e p204; Bailey 26/e p386-387, 25/e p378-379)

FEVER IN BURN PATIENTS

- Many of the physiological criteria that has been claimed to reflect sepsis are non-infectious manifestations of post injury hypermetabolism^Q.
 - Hyperthermia (39°C or greater) is occasionally a febrile response to infection, particularly in children, but episodic elevation in temperature are common in uninfected burn patients^Q.
- The hypermetabolic phase^Q mediated by greatly increased levels of catecholamines, prostaglandins, glucagon and cortisol occurs after the acute phase and also produces pathophysiological changes.
- Burn patients exhibit increased blood flow to organs and tissues, an increased internal core temperature, hypoproteinemia and edema formation^Q.

17. Ans. c. Inner zone is zone of coagulation; d. Hyperemia is due to vasodilatation; e. Zone of stasis is associated with vascular damage:
(Ref: Sabiston 19/e p521-522; Schwartz 19/e p197-199; Bailey 26/e p386-387, 25/e p378-379)



Pathophysiology of Burns Area of cutaneous injury

Zone of coagulation	Zone of stasis	Zone of hyperemia
<ul style="list-style-type: none"> Necrotic area of a burn where cells have been disrupted^a Tissue is irreversibly damaged^a at the time of injury. 	<ul style="list-style-type: none"> Area immediately surrounding the necrotic zone^a Moderate degree of insult with decreased tissue perfusion^a. Depending on the wound environment, can either survive or progress to coagulative necrosis^a. Associated with vascular damage and vessel leakage^a. 	<ul style="list-style-type: none"> Lies beyond the zone of stasis Characterized by vasodilation^a from inflammation surrounding the burn wound. Contains clearly viable tissue from which the healing process begins^a Generally, not at risk for further necrosis^a.

18. Ans. d. Anxiety

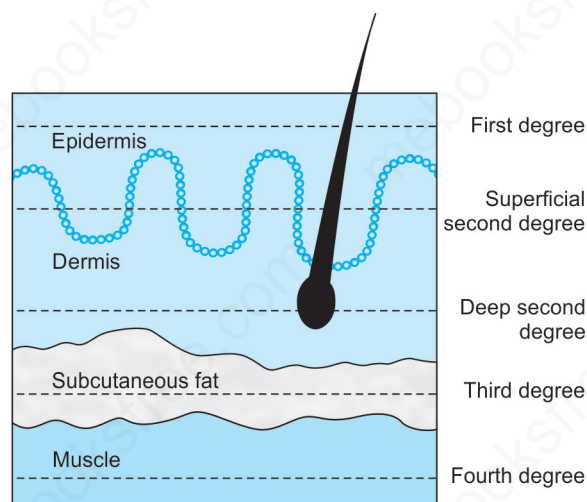
19. Ans. a. 5% burns in children

20. Ans. a. Hyperglycemia is seen in early burns

BURNS DEPTH

21. Ans. b. 2nd degree-Epidermis + papillary dermis; c. Blisters-2nd degree; d. Curling ulcer can occur; e. Classified according to depth of invasion (Ref: Sabiston 19/e p522-523; Schwartz 10/e p229, 19/e p199-200; Bailey 26/e p389-390, 25/e p381-382)

Burns Depth			
First Degree <ul style="list-style-type: none">• Epidermal burn^a• Involve only epidermis^a• Do not blister^a• Erythematous^a because of dermal vasodilatation• Painful^a• Heal without scarring in 5-10 days^a	Second Degree <ul style="list-style-type: none">• Partial thickness^a burn• Involve epidermis and some part of dermis^a• Divided into: Superficial and Deep second degree	Third Degree <ul style="list-style-type: none">• Full thickness burn^a• Involve all layers of dermis^a• Characterized by hard leathery eschar, that is painless and black, white or cherry red^a• No capillary refilling or pin-prick sensation^a• All dermal and epidermal components are lost^a• Heals only by wound contracture^a• Require excision with skin grafting to heal^a	Fourth Degree <ul style="list-style-type: none">• Involve other organs beneath the skin, such as muscle, bone and brain^a.
Superficial Second Degree <ul style="list-style-type: none">• Involve upper layer of dermis (papillary dermis)^a• Erythematous^a• Blisters are seen^a• Blanch to touch^a• Painful^a• Heals without scarring in 7-14 days^a		Deep Second Degree <ul style="list-style-type: none">• Also known as deep partial thickness burn^a• Injury extends to reticular layer of dermis^a• Don't blanch^a• Mottled pink and white color of wound surface^a• Capillary refilling is absent or occurs slowly^a• Pain is absent^a• Pin-prick sensation is preserved^a• Heals in 3-9 weeks with scar formation^a	



22. Ans. b. Anesthesia at the site of burn; c. Blister formation

23. Ans. d. Peripheral pulse and circulation (Ref: Sabiston 19/e p531; Schwartz 10/e p234, 1820, 19/e p204; Bailey 26/e p392, 25/e p385)

ESCHAROTOMIES

- When deep second- and third-degree burn wounds encompass the **circumference** of an **extremity**, **peripheral circulation** to the limb can be **compromised**.

- Development of **generalized edema** beneath a non-yielding eschar **impedes venous outflow** and **affects arterial inflow** to the distal beds.
- This can be **recognized by numbness and tingling** in the limb and **increased pain in digits**.

- Arterial flow** can be assessed by **determination of Doppler signals** in the digital arteries and the palmar and plantar arches in affected extremities.
- Capillary refill** can also be assessed.

- Extremities at risk** are identified either **on clinical examination** or by measurement of **tissue pressures >40 mm Hg**.
- These extremities **require escharotomies** (release of the **burn eschar** by **incising the lateral and medial aspects** of the extremity).

24. Ans. b. Painful

25. Ans. c. Dry white colour; d. Painless; e. Predispose to hypothermia

26. Ans. b. Deep partial thickness burns

27. Ans. d. Third degree burns

28. Ans. a. Full thickness burn feels, leathery, painless; e. 1 year of age in head and neck region covers 18% (Ref: Bailey 25/e p382, 387; CSDT 11/e p273)

- Electric burns** are both **superficial** and **deep**, depending upon the thickness involved.
- Curreri, Sutherland and Davies formulas** are **feeding formulas** of burn patients.

29. Ans. d. Extremely painful

30. Ans. b. 2 weeks

31. Ans. d. Less blanching

32. Ans. c. Blister formation; e. Can be healed within 7-10 days

33. Ans. d. Blisters

34. Ans. b. 2nd degree

35. Ans. b. Superficial second degree

36. Ans. a. Hyperthermia

37. Ans. b. Dermis

TREATMENT OF BURNS

38. Ans. a. Percentage of burns \times weight (kg) \times 4 = volume in ml (Ref: Sabiston 19/e p530; Schwartz 10/e p232, 19/e p199; Bailey 26/e p390-391, 25/e p384-385)

Resuscitation Formulas			
Formula	Crystalloid Volume	Colloid Volume	Free water
Parkland ^a	4 mL/kg per % TBSA burn	None	None
Brooke ^a	1.5 mL/kg per % TBSA burn	0.5 mL/kg per % TBSA burn	2.0 L
Galveston ^a (pediatric)	5000 mL/m ² burned area + 1500 mL/m ² total area	None	None

- **Half of fluid** is given in **first 8 hours** and **other half** in next 16 hours^Q

FLUID RESUSCITATION

- **IV fluid resuscitation:** In **children** with burn **>10%**^Q TBSA and **adult** with burn **>15%**^Q TBSA
- **Regimen of fluid resuscitation** follows the **fluid loss**, which is at its **maximum in first 8 hours** and slows such that by 2-36 hours the patient can be maintained on her/his normal daily requirement.

Fluids used in Resuscitation

- **Ringer Lactate** is most commonly used^Q.
- Some centers use **human albumin, FFP** or **hypertonic saline**^Q

- If **oral resuscitation** is to be commenced, it is important that the **water given is not salt free**. **Hyponatremia** and **water intoxication** can be fatal^Q.
- In **children**, **maintenance fluid** must be given, usually **dextrose-saline**^Q.
- **Simplest and most widely used formula: Parkland formula**^Q

- **Hypertonic saline** has been **effective in treating burn shock**^Q.
- It produces **hyperosmolarity** and **hypernatremia**.
- This reduces the shift of intracellular water to the extracellular space.
- Advantage includes **less tissue edema** and a resultant **decrease in escharotomies and intubation**^Q.

- **Protein** should be given **after the first 12 hours** of burn.
- The commonest **colloid based formula** is **Muir and Barclay formula**^Q.

Monitoring of Resuscitation

- The key to monitoring is **urine output**^Q.

- **Urine output** should be **0.5-1.0 ml/kg/hour**^Q (i.e. 30-60 ml per hour^Q).

- **Other measures for monitoring:**
 - Acid base balance and Hematocrit
 - In **cardiac dysfunction:** **Transesophageal USG** and **Central line**^Q

Venous Access for Infusion

- In **adults:** **Ideal sites** are **veins in hand, antecubital fossa** or **neck**.
- **Saphenous vein cut down** is useful in **patient with difficult access** and is **used in preference to central venous cannulation**.
- **CVP line** is used for **CVP monitoring**, helps in **estimating fluid overload**^Q.

39. Ans. a. Total % body surface area x weight x 4 = volume in ml
40. Ans. c. Shrine: 5000 ml m² TBSA burn + 2000 ml m² TBSA; d. Evans: 8ml Kg/% TBSA burn of RL
41. Ans. a. No bandage to head and neck; c. Superficial burns without blister-no need of dressing; d. Escharotomy done for peripheral circumscribed lesions (Ref: Sabiston 19/e p529-530; Schwartz 19/e p200-204; Bailey 26/e p387, 25/e p380)

CARE OF BURN PATIENTS

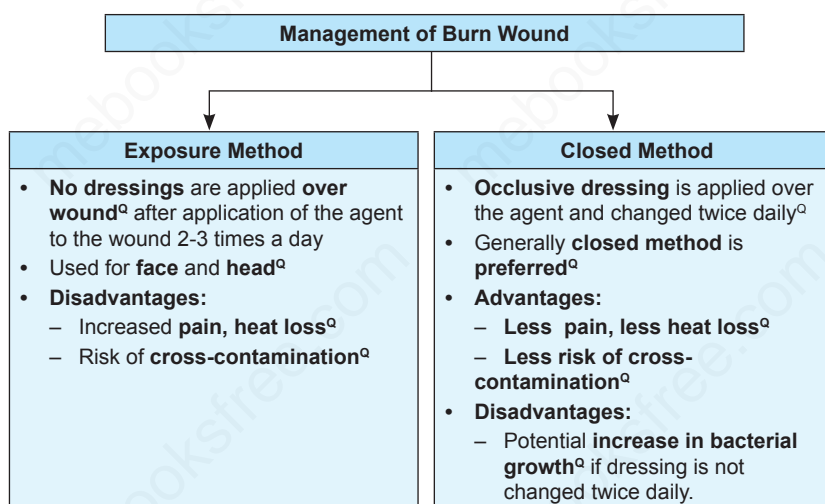
Cool the burn wound

- This **provides analgesia** and **slows the delayed microvascular damage** that can occur after a burn injury.
- Cooling should occur **for a minimum of 10 min** and is **effective up to 1 hour after the burn injury**.
- It is a **particularly important first aid step in partial-thickness burns**, especially **scalds**.
- In temperate climates, cooling should be at **about 15°C**, and hypothermia must be avoided.

- **Room temperature water** can be **poured** on the wound **within 15 minutes of injury** to decrease the depth of wound, but **any subsequent measures to cool the wound are avoided to prevent hypothermia**^Q.

- Iced water should never be used, even on the smallest of burns^Q.
- If ice or cold water is used on larger burns, systemic hypothermia often follows, and the associated cutaneous vasoconstriction can extend the thermal damage.

- The **entire constricting eschar** must be **incised longitudinally**^Q to completely relieve the impediment to blood flow.
- **Superficial partial thickness burn** with blisters **heals without residual scarring in 2 weeks** irrespective of the dressing. Treatment is **non-surgical**. The simplest method of **treating superficial burn** is by **exposure**^Q.



42. Ans. a. 15°C

43. Ans. d. 14-15°C

44. Ans. d. Elective endotracheal intubation (Ref: Bailey 26/e p388, 25/e p381)

INITIAL MANAGEMENT OF THE BURNED AIRWAY

- Early elective intubation is safest^Q
- Delay can make intubation very difficult because of swelling^Q
- Be ready to perform an emergency cricothyroidotomy if intubation is delayed^Q

45. Ans. c. Ringer lactate

46. Ans. b. Half of the calculated fluid should be given in initial 8 hours; c. 9 liters of Ringer's lactate should be given in first 24 hours; e. CVP line should be inserted

47. Ans. a. Consider intravenous resuscitation in children with burns greater than 15% TBSA

- IV fluid resuscitation: In children with burn >10% TBSA and adult with burn >15% TBSA

48. Ans. a. Fluid resuscitation

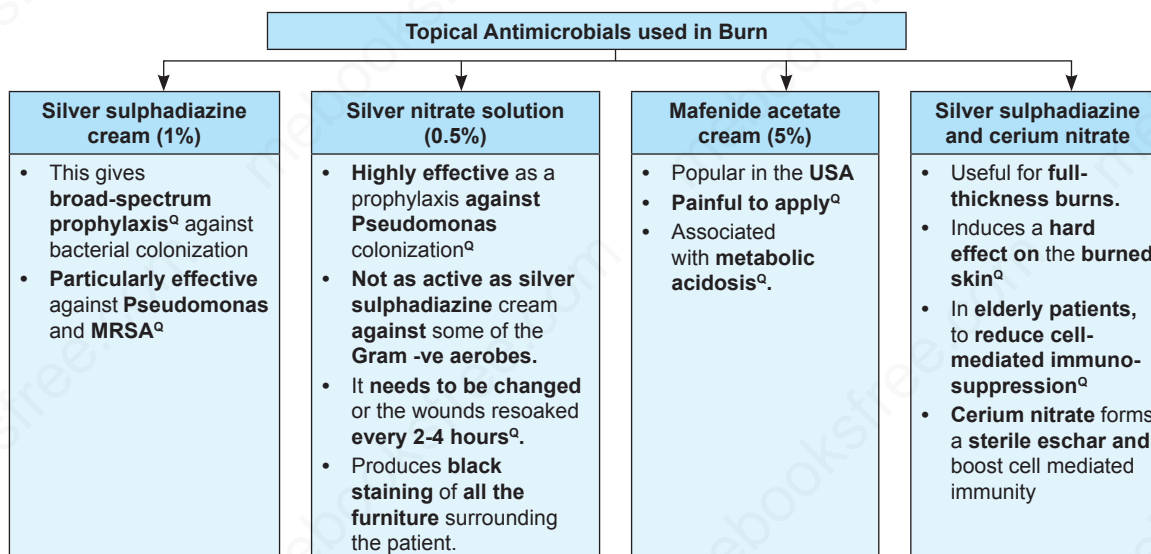
49. Ans. a. Blood (Ref: Sabiston 19/e p529-531; Schwartz 10/e p230, 19/e p200-201; Bailey 26/e p392, 25/e p384)

- RL is preferred agent for resuscitation for the initial 24 hours^Q.
- Nasogastric intubation is done to decrease the risk of emesis and possible aspiration (as paralytic ileus develops in the patients of burn).
- Dextran is a colloid and can be used after 24 hours however, albumin is the preferred and most widely used colloid^Q.

50. Ans. c. Half of the calculated fluid given in initial 8 hours; d. Urine output should be maintained at 50-60 mL/hour

51. Ans. d. Pseudomonas is most common infection in dry wound (Ref: Sabiston 19/e p533-534; Schwartz 19/e p202; Bailey 26/e p392-393, 25/e p384-386)

- In burn management, topical antimicrobials are used.
- Pseudomonas is the most common infection^Q in burn patients. It has replaced streptococci and staphylococci because of availability of good antibiotics.
- Toxic shock syndrome is most commonly associated with tampon use in menstruating females. It is caused by Staphylococcus infection producing TSST-1.
- Damp dressing should not be used.



52. Ans. b. Escharotomy should be done for peripheral circumscribed lesion; e. Prognosis depend on the time of resuscitation of the patient
53. Ans. e. Head and neck 54. Ans. a. Split thickness graft 55. Ans. c. Infection (Ref: CSDT 11/e p1272)
56. Ans. b. 30-50 ml 57. Ans. c. Head and Neck 58. Ans. a. Silver sulphadiazine
59. Ans. d. Dextrose saline

COMPLICATIONS OF BURNS

60. Ans. a. Sepsis (Ref: Sabiston 19/e p534-536; Schwartz 10/e p233, 19/e p204; Bailey 26/e p394-395, 25/e p387-390)
- Following successful resuscitation, most acute morbidity and virtually all mortality in severely burned patients are related to infection^Q.
 - This is because thermal injury causes profound immunosuppression that is proportional to the TBSA of the burn^Q.
 - In spite of burn patients at significant risk to infection, prophylactic systemic antibiotics are not part of modern care, as they do not reduce septic complications and only lead to increased bacterial resistance^Q.

- MC cause of death in burns: Septicemia^Q
- MC cause of early death in burns: Hypovolemic shock^Q
- MC cause of late death in burns: Septicemia^Q

61. Ans. b. Hypovolemic shock
62. Ans. a. Squamous cell carcinoma
63. Ans. d. Septicemic shock

CARCINOMA IN BURNS

- Squamous cell carcinoma is MC carcinoma in burns^Q.
- SCC commonly occurs in long standing (Marjolin's ulcer), old scar or keloid^Q.
- Both Marjolin's ulcer and keloid are complications that arise after burns^Q.

64. Ans. a. Hypovolemic (Ref: Sabiston 19/e p521-522; Schwartz 19/e p204; Bailey 26/e p390-391, 25/e p384-386)
- Proper fluid management is critical to survival^Q in burn patient.
 - The hypovolemic shock^Q in burn patient is special in the sense that total body water remains unchanged in a burn patient.
 - The thermal injury leads to a massive shift from the intravascular compartment to the extravascular compartment leading to edema formation^Q.
65. Ans. a. Occur because of conservative management of deep burn; b. Treated by flaps; c. Obliteration of cervicomentangle; d. Dental abnormalities may be present (Ref: Total Burn Care by David N. Herndon 3/e p714-715; Sabiston 19/e p534-535; Schwartz 10/e p182, 19/e p204; Bailey 26/e p396, 25/e p388)

POST BURN NECK CONTRACTURE

- Cervical contractures are major problems in burns involving the chest, neck and face^Q.

- Severe neck flexion contracture in the acute phase often require early reconstruction^Q to aid in airway management
- Neck contractures should usually be dealt with prior to facial burn reconstruction^Q as the extrinsic contractile forces from the neck can cause facial deformities and can adversely affect the maturation of scars on the face.
 - When split-thickness skin grafting is unsuccessful because of recurrent contracture or does not provide a satisfactory aesthetic result, local flap reconstruction of anterior neck is an excellent technique^Q.
- Perioral Deformities: Microstomia, macrostomia, irreversible damage to dentition and loss of jawline definition^Q
- Anterior neck contractures in the acute period are best prevented by aggressive splinting and incisional releases and grafting^Q when indicated.
 - Deep second and third degree burns do not heal in timely fashion without autografting^Q
 - Escharotomies is done in case of deep second and third degree buns wounds to decrease constriction of eschar^Q

66. Ans. c. Renal failure

MISCELLANEOUS

67. Ans. d. Deep subcutaneous tissue damage (Ref: Bailey 26/e p399, 25/e p391)

LOW-TENSION INJURIES

- Low-tension or domestic appliance injuries do not have enough energy to cause destruction to significant amounts of subcutaneous tissues^Q when the current passes through the body.
- Resistance is too great.
- Entry and exit points, normally in the fingers, suffer small deep burns; these may cause underlying tendon and nerve damage, but there will be little damage between.
- The alternating current creates a tetany within the muscles, and thus patients often describe how they were unable to release the device until the power was turned off.
- A common finding in patients with electric burns is myoglobinuria manifested as highly concentrated and pigmented urine.
 - Main danger with these injuries is from the alternating current interfering with normal cardiac pacing. This can cause cardiac arrest^Q.
 - The electricity itself does not usually cause significant underlying myocardial damage, so resuscitation, if successful, should be lasting.

68. Ans. b. Cardiac arrest

69. Ans. d. Electrosurgical equipment (Ref: British Journal of Anesthesia, vol 50, Issue 7, Page 659-664)

OPERATION THEATRE FIRE

- The two most common source of operation theatre fire is electrosurgical unit (ESU) and lasers.
- ECRI's analysis of case reports show that the most common ignition sources are electrosurgical instruments (68%) and lasers (13%).
- Most common fire location is airway (35%), head or face (28%), and elsewhere on or inside the patient (38%).
- An oxygen-enriched atmosphere was a contribution factor in 74% of all cases.

70. Ans. c. Electric burn

Plastic Surgery and Skin Lesions

MULTIPLE CHOICE QUESTIONS

SKIN GRAFTING

1. "Take in" of split skin graft occurs when? (PGI Dec 2008)

- Tight dressing is applied
- Excessive discharge from wound
- β -hemolytic streptococcus infection is present
- Wound bed not vascularised

2. Thiersch graft is which type of graft?

(JIPMER 2012, MHPGMCET 2008, 2001, DPG 2005)

- Partial thickness
- Full thickness
- Pedicle
- Patch

3. Partial thickness graft is:

(MHPGMCET 2008)

- Wolffian graft
- Thiersch graft
- Pedicle graft
- Patch graft

4. Which of the following statements about mesh skin grafts is not correct? (UPSC 2006)

- They permit coverage of large areas
- They allow egress of fluid collections under the graft
- They contract to the same degree as a grafted sheet of skin
- They "take" satisfactorily on a granulating bed

5. Split skin grafts in young children should be harvested from: (UPSC 2007)

- Buttocks
- Thigh
- Trunk
- Upper limb

6. Which of the following is not a wound closure technique? (UPSC 2008)

- Partial thickness skin graft
- Composite graft
- Vascular graft
- Musculocutaneous graft

7. Who said: "Skin is the best dressing"? (Karnataka 2004)

- Joseph Lister
- John Hunter
- James Paget
- Mc Neill Love

8. Within 48 hours of transplantation, skin graft survives due to: (AIIMS Nov 2000, AIIMS Nov 99)

- Amount of saline in graft
- Plasma imbibition
- New vessels growing from the donor tissue
- Connection between donor and recipient capillaries

9. Ideal graft for leg injury with 10×10 cm exposed bone: (AIIMS Nov 99)

- Amniotic membrane graft
- Pedicle graft
- Full thickness graft
- Split thickness skin graft

10. Which of the following graft is known as Wolfe's graft?

(AIIMS Nov 97)

- Split thickness graft
- Full thickness graft
- Partial thickness graft
- Myocutaneous graft

11. Wolfe Graft is:

(APPG 2015)

- Thin split thickness graft
- Thick split thickness skin graft
- Medium thickness split thickness skin graft
- Full thickness skin graft

12. Skin grafting is absolutely contraindicated in which skin infection? (AIIMS June 97)

- Staphylococcus
- Pseudomonas
- Streptococcus
- Proteus

13. What does "Take in" means in case of skin grafting?

(AIIMS June 97)

- Revascularization of the graft
- Return of the sensation
- When the graft becomes adherent to recipient site
- Non adherent graft is shed off

14. All can take split thickness graft except:

(MCI March 2005, AIIMS Sept 96)

- Fat
- Muscle
- Skull bone
- Deep fascia

15. All are true about skin grafting, except: (All India 2000)

- Partial thickness graft involves epidermis and part of dermis
- Full thickness graft includes epidermis, dermis, without subcutaneous tissue
- For large areas, full thickness graft is used
- Full thickness graft has cosmetic value

16. Split skin graft can be applied over:

(PGI June 99)

- Muscle
- Bone
- Cartilage
- Eyelid

17. Skin graft for facial wounds is taken from:

(AIIMS 92)

- Medial aspect of thigh
- Cubital fossa
- Groin
- Postauricular region

18. Full thickness skin graft can be taken from the following sites except: (AIIMS 87)

- Elbow
- Back to neck
- Supraclavicular area
- Upper eyelids

19. Skin graft stored at 4°C can survive up to:

(DNB 2009)

- 1 week
- 2 weeks
- 3 weeks
- 4 weeks

20. The best skin graft for open wounds is: (All India 93)
- Isograft
 - Homograft
 - Allograft
 - Autograft

21. All are advantages of split thickness skin grafting except: (Recent Questions 2013)
- Good uptake
 - Reusable donor site
 - Less contraction
 - Large grafts can be harvested

22. Identify the correct statement regarding skin grafts & flaps: (APPG 2016)
- Grafts are tissues that are transferred without their blood supply and they revascularise at the new site
 - In pedicle flaps, various tissues, often with bone or muscle, are transferred
 - Full thickness grafts are useful for rebuilding missing elements of nose etc.
 - Split thickness grafts have limited durability and are called Wolfe grafts

FLAPS

23. True statement for axial flap is: (All India 97)
- Carries its own vessels within it
 - Kept in limb
 - Transverse flap
 - Carries its own nerve in it
24. Best procedure to be done after an injury to leg associated with exposure of underlying bone and skin loss: (AIIMS Nov 98)
- Pedicle flap
 - Split skin grafting
 - Full thickness grafting
 - Skin flap
25. Abbe-Estlander flap is used for: (All India 2008)
- Lip
 - Tongue
 - Eyelid
 - Ears
26. Skin flap is used in all except: (AIIMS 89)
- Bone
 - Tendon
 - Burn wound
 - Cartilage
27. The subdermal plexus forms the vascular basis for: (JIPMER 2002)
- Randomised flaps
 - Axial flaps
 - Mucocutaneous flaps
 - Fasciocutaneous flaps
28. Myocutaneous flap includes which tissues? (DPG 2007)
- Muscle only
 - Muscle and vascular pedicle
 - Muscle and skin
 - Skin, muscle and vascular pedicle

MARJOLIN'S ULCER

29. The most common malignancy found in Marjolin's ulcer is: (DPG 2009 Feb)
- Basal cell carcinoma
 - Squamous cell carcinoma
 - Malignant fibrous histiocytoma
 - Neutrophic malignant melanoma
30. True about Marjolin's ulcer: (PGI June 2007)
- The associated cancer is squamous cell carcinoma
 - May occur due to chronic venous insufficiency
 - Progress to basal cell carcinoma
 - Arise from base of the ulcer
31. A tumour arising in a burns scar is likely to be: (Recent Question 2014, COMEDK 2009, PGI June 2006, June 97)

- Basal cell carcinoma
- Squamous cell carcinoma
- Malignant melanoma
- Fibrosarcoma

32. Which of the following is true about Marjolin's ulcer? (Orissa 2011, PGI Dec 97)

- Ulcer over scar
- Rapid growth
- Rodent ulcer
- Painful

33. True about Marjolin's ulcer: (PGI Dec 2003, June 2007)

- Develops in long standing scar
- Squamous cell carcinoma develops
- Slow growing lesion
- Also known as Baghdad sore
- Common in Black races

PREMALIGNANT LESIONS OF SKIN

34. Bowen's disease is: (DPG 2005)
- Mimics chronic dermatosis
 - Premalignant condition
 - Presents with pruritus
 - All of the above
35. Premalignant conditions of the skin include: (JIPMER 86)
- Bowen disease
 - Paget's disease of nipple
 - Leukoplakia
 - Presence of malignancy
 - All of the above
36. All the following are premalignant conditions except: (MHSSMCET 2008)
- Actinic Keratosis
 - Steatoma multiplex
 - Erythroplakia of Queyrat
 - Keratosis of lip

SQUAMOUS CELL CARCINOMA

37. Squamous cell carcinoma can arise from: (PGI 88)
- Long standing venous ulcers
 - Chronic lupus vulgaris
 - Rodent ulcer
 - All of the above
38. Margins of squamous cell carcinoma is: (JIPMER 81, DPG 86)
- Inverted
 - Everted
 - Rolled
 - Undermined
39. Buschke-Lowenstein tumor is: (TN 2003)
- Molluscum contagiosum
 - Condyloma lata
 - Giant condyloma accuminata
 - Metastasis

BASAL CELL CARCINOMA

40. The commonest clinical pattern of basal cell carcinoma is: (COMEDK 2008, MCI March 2005)
- Nodular
 - Morpheaform
 - Superficial
 - Keratotic
41. Most common site of basal cell carcinoma is: (All India 94, MHPGMCET 2001)
- Face
 - Trunk
 - Neck
 - Extremities
42. A 48 years old sports photographer has noticed a small nodule over the upper lip from four months. The nodule is pearly white with central necrosis, telangiectasia. The most likely diagnosis would be:
- Basal cell carcinoma
 - Squamous cell carcinoma
 - Atypical melanoma
 - Kaposi sarcoma

43. Which of the following cutaneous malignancies do not metastasize through the lymphatics? (All India 94)
- Squamous cell carcinoma
 - Basal cell carcinoma
 - Melanoma
 - Kaposi's sarcoma
44. Diagnostic procedure for basal cell carcinoma: (PGI June 98)
- Wedge biopsy
 - Shave
 - Incisional biopsy
 - Punch biopsy
45. All of the following are true about basal cell carcinoma except: (DNB 2009)
- Most common site is upper eyelid
 - Locally invasive
 - Rarely metastasizes
 - Associated with exposure to sun
46. In pigmented basal cell carcinoma, treatment of choice is:
- Chemotherapy
 - Radiotherapy (PGI 98)
 - Cryosurgery
 - Excision
47. Moh's micrographic excision for basal cell carcinoma is used for all of the following except: (Karnataka 2006)
- Recurrent Tumor
 - Tumor less than 2 cm in diameter
 - Tumors with aggressive histology
 - Tumors with perineural invasion
48. Basal cell carcinoma spreads by: (MAHE 2007)
- Lymphatics
 - Hematogenous
 - Direct spread
 - None of the above
49. About basal cell carcinoma, false is: (DPG 2006)
- Spreads to local lymph nodes
 - Seen on face
 - Seen on exposure of sunlight to skin
 - Responds well to radiation
50. Characteristic feature of basal cell carcinoma is: (AIIMS May 2012)
- Keratin pearls
 - Foam cells
 - Nuclear palisading
 - Psammoma bodies
51. Reconstruction of tip of nose after excision of basal cell carcinoma is done by? (DNB 2014)
- Bipedicled flap
 - Bilobed flap
 - Full thickness skin graft
 - Split skin graft
52. In the Clarke's level of tumor invasion for malignant melanoma level 3 refers to: (COMEDK 2006)
- All tumor cells above basement membrane
 - Invasion into reticular dermis
 - Invasion into loose connective tissue of papillary dermis
 - Tumors cell at junction of papillary and reticular dermis
53. True about malignant melanoma: (PGI June 2008)
- Lymphatic spread
 - Lymph node biopsy is always done
 - Biopsy to be done when sentinel node is involved
 - Microsatellitism
54. Common features of melanoma, which of the following is not the part of mnemonic ABCDE? (MHSSMCET 2009)
- Elevation
 - Asymmetric outline
 - Variation in color
 - Diameter < 6 mm
55. In malignant melanoma, change seen is all except:
- Ulceration
 - Bleeding (DPG 2006)
 - Satellite lesions
 - Hair in mole
56. Treatment of choice for melanoma is: (DPG 2006)
- Chemotherapy
 - Surgical excision
 - Radiotherapy
 - Surgery and chemotherapy
57. Most common origin of melanoma is from: (Bihar PG 2014, AIIMS Nov 2001)
- Junctional melanocytes
 - Epidermal cells
 - Basal cells
 - Follicular cells
58. Most common type of malignant melanoma is:
- Superficial spreading (AIIMS Nov 2001, UPPG 2009)
 - Lentigo maligna melanoma (JIPMER 2014, 2012)
 - Nodular
 - Acral lentiginous
59. Most common site of lentigo maligna melanoma is: (DNB 2013, AIIMS Nov 2001)
- Face
 - Legs
 - Trunks
 - Soles
60. The most malignant form of malignant melanoma is:
- Nodular (PGI June 99)
 - Hutchinson's melanotic freckle
 - Acral lentiginous type
 - Superficial spreading
61. Prognosis of melanoma depends on: (PGI June 98)
- Stage
 - Depth of melanoma of biopsy
 - Duration of growth
 - Site
62. All of the following statements about malignant melanoma are true except: (All India 97)
- Prognosis is better in female than in male
 - Acral lentiginous melanoma carries a good prognosis
 - Stage IIa shows statelite deposits
 - Most common type is superficial spreading melanoma
63. Biopsy from a mole on the foot shows cytologic atypia of melanocytes and diffuse epidermal infiltration by anaplastic cells, which are also present in the papillary and reticular dermis. The most likely diagnosis is: (All India 2004)
- Melanoma, Clark level IV
 - Congenital melanocytic nevus
 - Dysplastic nevus
 - Melanoma, Clark level III
64. A 35 years old premenopausal patient as recently developed a 1.5 cm sized pigmented lesion on her back. Which of the following forms of tissue diagnosis will you recommended for her?
- Needle biopsy
 - True-cut biopsy
 - Excision biopsy
 - Incisional biopsy
65. Which of the following is true about melanoma?
- Amelanotic melanoma is associated with worst prognosis
 - Complete excisional biopsy is the management
 - Thinner melanoma has good prognosis
 - Back in MC site is females (PGI Dec 2005)
 - Congenital giant nevus is associated with minimal risk of malignancy

MALIGNANT MELANOMA

66. Melanoma should be excised with a margin of: (UPSC 88)
- 2 cm
 - 5 cm
 - 7 cm
 - 10 cm

67. Most severe form of malignant melanoma is: (Kerala 94)
- Superficially spreading
 - Nodular infiltrating type
 - Those arising in lower type
 - Those in choroid

68. Melanoma staging is based on which classification? (DNB 2009)
- Breslow
 - Clark's
 - Both
 - Bethesda

69. Worst prognosis in melanoma is seen in the subtype: (Kerala 2001)
- Superficial spreading
 - Nodular melanoma
 - Lentigo maligna melanoma
 - Amelanotic melanoma

70. Least common site for spread of melanomas: (DNB 2012)
- GIT
 - Lungs
 - Liver
 - Renal

71. Which one of the following is not included in the treatment of malignant melanoma? (UPSC 2005)
- Radiation
 - Surgical excision
 - Chemotherapy
 - Immunotherapy

72. A 40 years old man presented with a flat 1 cm × 1 cm scaly, itchy black mole on the front of thigh. Examination did not reveal any inguinal lymphadenopathy. The best course of management would be: (UPSC 2007)
- FNAC of the lesion
 - Incision biopsy
 - Excisional biopsy
 - Wide excision with inguinal lymphadenectomy

73. Inguinal lymph node enlargement is seen in: (MPPG 97)
- Seminoma testis
 - Malignant melanoma foot
 - CA cervix
 - None

74. Risk factor for malignant melanoma all the following are risk factors for malignant melanoma except: (DNB 2014)
- Giant congenital nevi
 - Family history melanoma
 - Exposure to UV light
 - HPV infection

75. Marker of Melanoma: (JIPMER 2014)
- S-100
 - CK-20
 - MTLF
 - VIMENIN

SKIN PATCH/ STAIN/ HEMANGIOMA

76. Which of the following is a regressing tumor? (DPG 2011)
- Portwine stain
 - Strawberry angioma
 - Venous angioma
 - Plexiform angioma

77. True about congenital hemangioma:
- Congenital variety stops growing after birth
 - Fully mature at birth (PGI June 2007, Dec 2007)
 - NICH variety persists
 - RICH variety involutes
 - Calcification can occur

78. Following is regressive tumor: (MHPGMCET 2007)
- Venous angioma
 - Strawberry angioma
 - Port-wine stain
 - Juvenile angioma

79. Treatment for strawberry angioma: (MHSSMCET 2006, JIPMER 95)
- Steroids
 - Local excision
 - Masterly inactivity
 - Antibiotic coverage

80. The best results in treatment of capillary nevus have been achieved by: (AIIMS 84)
- Full thickness skin graft
 - Dermabrasion
 - Tattooing
 - Argon laser treatment

81. Spontaneous regression is seen in all except: (All India 93)
- Salmon patch
 - Small cavernous hemangioma
 - Portwine stain
 - Strawberry angioma

82. Salmon patch usually disappears by age: (PGI 80, 81, UPSC 89)
- One month
 - One year
 - Puberty
 - None of the above

83. Eleven months old child presents with erythematous lesion with central clearing which has been decreasing in size: (All India 97)
- Strawberry angioma
 - Nevus
 - Portwine stain
 - Cavernous hemangioma

84. Regarding hemangiomas following are true:
- Salmon patch disappears after the age of one
 - Port wine stain present throughout life
 - Salmon patch-on forehead midline and over occiput
 - All are correct

85. The best cosmetic results for large capillary (port wine) hemangiomas are achieved by: (UPSC 2005)
- Excision and split-thickness skin
 - Laser ablation
 - Chemotherapy
 - Immunotherapy

86. Best method to treat a large port-wine hemangiomas: (DNB 2010)
- Radiotherapy
 - Tattooing
 - Excision with skin grafting
 - Pulsed eye laser

87. Which is not true about Sturge Weber syndrome? (AIIMS Sept 96)
- Portwine stain
 - Calcification in brain
 - Cortical atrophy
 - Intracranial hamartoma

88. Which of these does not change or remains same throughout life? (AIIMS Nov 2001)
- Salmon patch
 - Strawberry angiomas
 - Portwine stain
 - Capillary hemangiomas

89. Spontaneous regression is seen in: (All India 98, All India 97)
- Portwine hemangioma
 - Strawberry hemangioma
 - Cavernous hemangioma
 - Arterial angioma

SEBACEOUS CYST

90. Sebaceous cyst does not occur in the: (PGI 88)
- Scalp
 - Scrotum
 - Back
 - Sole

91. True about epidermoid cyst:

(PGI Dec 2005)

- a. Punctum is present
- b. Keratin is present
- c. Sebaceous material present
- d. Autosomal inheritance
- e. May turn malignant

92. Sebaceous cyst is:

(DNB 2004)

- a. Distention cyst
- b. Retention cyst
- c. Implantation dermoid
- d. Mucus cyst

93. Cock's peculiar tumor is:

(DNB 2009, MCI Sept 2007)

- a. Infected sebaceous cyst
- b. Osteomyelitis of skull
- c. Cyst in the skull
- d. Tumor of the skull

94. Cock's peculiar tumor is:

(Recent Question 2014, AIIMS Nov 2010)

- a. Basal cell carcinoma
- b. Squamous cell carcinoma
- c. Ulcerated sebaceous cyst
- d. Cylindroma

LIPOMA**95. The term universal tumor refers to:**

(PGI 88)

- a. Adenoma
- b. Papilloma
- c. Fibroma
- d. Lipoma

96. Dercum's disease is commonest in the:

(JIPMER 81, DPG 86)

- a. Face
- b. Arm
- c. Back
- d. Thigh

97. Lipoma becomes malignant commonly at which site:

(JIPMER 88)

- a. Subcutaneous
- b. Retro-peritoneal
- c. Sub-aponeurotic
- d. Intermuscular

98. Dercum's disease is characterized by:

(DNB 2008)

- a. Lipodermatosclerosis
- b. Tender subcutaneous lipoma
- c. Morbid obesity
- d. None

99. Myxomatous degeneration is lipoma is seen in those occurring in:

(MHSSMCET 2006)

- a. Breast
- b. Pancreas
- c. Intramuscular
- d. Retroperitoneum

HIDRADENITIS SUPPURATIVA**100. Hidradenitis suppurativa is found to occur in:**

(JIPMER 86, AIIMS 87)

- a. Axilla
- b. Circumanal
- c. Scalp
- d. Groin

KERATOCANTHOMA**101. Keratocanthoma is:**

(AIIMS 85)

- a. A type of basal cell carcinoma
- b. Infected sebaceous cyst
- c. Self healing nodular lesion with central ulceration
- d. Pre-malignant disease

102. True about keratocanthoma:

(PGI 2000)

- a. Benign tumor
- b. Malignant skin tumor like squamous cell carcinoma
- c. Treatment same as for squamous cell carcinoma
- d. Easy to differentiate from squamous cell carcinoma histologically
- e. Treatment is masterly inactivity

MISCELLANEOUS**103. Cause of persistence of a sinus or fistulae includes:**

(JIPMER 86)

- a. Foreign body
- b. Non dependent drainage
- c. Unrelieved obstruction
- d. Presence of malignancy
- e. All of the above

104. The best dressing is:

(PGI 88)

- a. Opsitie
- b. Amnion
- c. Tulle grass
- d. Skin

105. Hydrocele is a type ofcyst:

(PGI 88)

- a. Retention
- b. Distension
- c. Exudation
- d. Traumatic

106. Calcifying epithelioma is seen in:

(JIPMER 95)

- a. Dermatofibroma
- b. Adenoma sebaceum
- c. Pyogenic granuloma
- d. Pilomatrixoma

107. Boil can occur at all sites except:

(TN 95)

- a. Pinna
- b. Skin
- c. Scalp
- d. Palm

108. Frost bite is treated by:

(AMC 2000)

- a. Rapid rewarming
- b. Slow rewarming
- c. IV pentoxifyllin
- d. Amputation

109. Treatment for pyoderma gangrenosum is:

(Jharkhand 2003)

- a. Steroids
- b. I.V. antibiotics
- c. Surgery + antibiotics
- d. Surgery alone

110. Which of the following materials for implants will evoke least inflammatory tissue response?

- a. Polypropylene
- b. Bovine collagen
- c. Polyagactin
- d. Cotton

111. Cylindroma is

(DPG 2007)

- a. Appendage tumor
- b. Acinic cell carcinoma
- c. Pleomorphic adenoma
- d. Warthin's tumour

112. Pyogenic granuloma, true statements is/are:

(PGI June 2007)

- a. Vascular pathology
- b. Bleeds rarely
- c. Increased in pregnancy
- d. Local excision
- e. Recurrent and malignant

113. Lines of Blaschko represent:

(All India 2011)

- a. Lines along lymphatics
- b. Lines along blood vessels
- c. Lines along nerves
- d. Lines of development

114. Bedsore is an example of:

(All India 99)

- a. Tropical ulcer
- b. Trophic ulcer
- c. Venous ulcer
- d. Post thrombotic ulcer

115. Ainhum is seen in:

(Recent Question 2014, All India 99)

- a. Base of great toe
- b. Base of fingers tips
- c. Base of toe
- d. Ankle

116. In hand injury, first structure to be repaired should be:

(All India 98, All India 95)

- a. Skin
- b. Nerve
- c. Muscle
- d. Bone

117. Trophic ulcers are caused by:

(PGI June 2002)

- a. Leprosy
- b. Buerger's disease
- c. Syringomyelia
- d. DVT
- e. Varicose veins

118. Which of the following is true?

(PGI Dec 2005)

- a. Viral warts spontaneously resolve
- b. Plantar warts should not be excised
- c. Callosity are formed occupationally
- d. Corns are viral in etiology

119. Ulcer with undermined edges is seen in:

(MHPPGNET 2005)

- a. Malignant ulcer
- b. Tubercular ulcer
- c. Venous ulcer
- d. Trophic ulcer

120. Which of the following is not a true cyst?

(MHPGMCET 2006)

- a. Sebaceous cyst
- b. Dermoid cyst
- c. Bone cyst
- d. Apoplectic cyst

121. Pilomatrixoma is:

(MHPGMCET 2006)

- a. A fleshy skin mass
- b. A type of skin tag
- c. A benign epithelial tumor
- d. A malignant skin neoplasm

122. Sinus is lined by:

(MHPGMCET 2007)

- a. Simple squamous epithelium
- b. Columnar epithelium
- c. Granulation tissue
- d. Fibrous tissue

123. A swelling which is variable in consistency with diffuse margins is likely to be:

(MHSSMCET 2005)

- a. Inflammatory
- b. Benign
- c. Malignant
- d. Non-specific

124. Zadek's procedure is:

(MHSSMCET 2005)

- a. Resection of part of nail with nail bed
- b. Resection of complete nail with part of nail bed
- c. Injection phenol at base of toe nail
- d. Wide excision of nail

125. Which of the following is a compressible swelling:

(DNB 2013, 2010)

- a. Lipoma
- b. Hernia
- c. Hemangioma
- d. Sebaceous cyst

126. Which of the following flap is used for eye lid surgery?

(MHSSMCET 2010)

- a. Bilope flap
- b. Rhomboid flap
- c. Bipedicle flap
- d. Transposition flap

127. Radiotherapy is the treatment of choice of which one of the following tumors?

(UPSC 2008)

- a. Verrucous carcinoma
- b. Malignant melanoma
- c. Marjolin's ulcer
- d. Rodent ulcer

128. Pott's Puffy tumor refers to:

(COMEDK 2014)

- a. Osteomyelitis of the frontal bone
- b. Tuberculosis of the spine
- c. Actinomycosis of maxilla
- d. Osteonecrotic tumor of Jaw

EXPLANATIONS

SKIN GRAFTING

1. Ans. None (Ref: Sabiston 19/e p1916-1917; Schwartz 10/e p264-265, 266, 9/e p1651; Bailey 26/e p402-403, 25/e p395-396)

Light compression wraps favor 'take in' of split skin graft, not the tight dressing.

GRAFT TAKE

- Skin graft take occurs in three phases, imbibition, inosculation, and revascularization.

Plasma Imbibition	Inosculation	Revascularization
<ul style="list-style-type: none"> • Graft survives upto first 48 hours^Q because of plasma imbibition • Involves free absorption of nutrients into the graft 	<ul style="list-style-type: none"> • Donor and recipient capillaries are aligned during inosculation^Q • Inosculation completes by 4-5 days^Q 	<ul style="list-style-type: none"> • After 5 days^Q, revascularization occurs • Graft demonstrates both arterial and venous outflow^Q

- During these initial few days the graft is most susceptible to deleterious factors such as **infection, mechanical shear forces and hematoma or seroma^Q**.

PARTIAL THICKNESS (THIERSCH) OR SPLIT SKIN GRAFT

- Consist of **epidermis and variable portion of dermis^Q**
- **Large size of graft can be taken^Q**
- **Site: Thigh (MC)^Q** upper arm, flexor aspect of forearm and abdominal wall
- Grafts are **hairless and do not sweat^Q** (these structures are not transferred)

- Skin graft must be **applied to a well-vascularized recipient wound bed**. It will **not adhere to exposed bone, cartilage, or tendon** devoid of periosteum, perichondrium, or peritenon, respectively, or devoid of its vascularized perimembranous envelope.

- **MC causes of skin graft failure: Hematoma** (or seroma), **infection**, and **movement** (shear).
- **Pie crusting:** Stab incisions in the graft preemptively to **create small outlets for fluid to drain** from beneath the graft

- **Beta hemolytic Streptococci can destroy split skin grafts completely, presence of this organism is a contraindication to grafting^Q.**

- **Graft immobilization is critical to the graft take** and can be accomplished with bolster dressing, light compression wraps or a vacuum assisted closure device.

2. Ans. a. Partial thickness (Ref: Sabiston 19/e p916-917; Schwartz 10/e p264-265, 266, 9/e p1651; Bailey 26/e p407-408, 25/e p395-396)

Skin Grafts

Partial Thickness (Thiersch) Graft	Full Thickness (Wolfe's) Graft
<ul style="list-style-type: none"> • It includes all epidermis and part of dermis^Q. • Partial thickness grafts are thin, uptake of graft is easy (easy survival)^Q. • Large grafts could be taken as the donor site is left with a part of dermis which will cause easy regeneration of epidermis^Q. • Contract upto 40%, not useful for cosmetic surgeries^Q. • Donor site will heal well^Q without any contraction, and is reusable. 	<ul style="list-style-type: none"> • It includes all epidermis and dermis^Q. • Uptake is difficult because of thickness • Less chances of survival • Small grafts could be taken^Q as the donor site does not have epidermal or dermal remnants to allow epithelialization • Very minimal contraction making it suitable for cosmetic surgeries on face^Q. • Donor site will have to be closed primarily or left open to granulate and contract^Q.

Contraction of Graft

- **Primary** : Occurs when the graft is harvested, **depends upon amount of dermis present, more in full thickness graft**
- **Secondary** : Occurs after the surgery, **more in partial thickness graft**

3. Ans. b. Thiersch graft

4. Ans. c. They contract to the same degree as a grafted sheet of skin (Ref: Sabiston 19/e p1917; Schwartz 10/e p264-265, 9/e p1651; Bailey 26/e p404-405, 25/e p401)

MESHED SKIN GRAFTS

- Split grafts may be meshed to expand the surface area that can be covered^Q.
- This technique is particularly useful when a large area must be resurfaced, as in major burns.
- Meshed grafts usually also have enhanced reliability of engraftment, because the fenestrations allow for egress of wound fluid and excellent contour matching of the wound bed by the graft^Q.
- Fenestrations in meshed grafts re-epithelialize by secondary intention from the surrounding graft skin.
- Major drawbacks of meshed grafts are poor cosmetic appearance and high secondary contraction^Q.
- Meshing ratios used usually range from 1:1.5 to 1:6, with higher ratios associated with magnified drawbacks.

5. Ans. b. Thigh

6. Ans. c. Vascular graft

7. Ans. a. Joseph Lister: en.wikipedia.org/wiki/Joseph_Lister

- Joseph Lister said "Skin is the best dressing".

8. Ans. b. Plasma imbibition

9. Ans. b. Pedicle graft (Ref: Sabiston 19/e p1917; Schwartz 9/e p1651; Bailey 25/e p397-399)

- Skin graft must be applied to a well-vascularized recipient wound bed. It will not adhere to exposed bone^Q, cartilage^Q, or tendon^Q devoid of periosteum, perichondrium, or peritenon, respectively, or devoid of its vascularized perimembranous envelope.
- Radiation damaged tissues are poor recipient sites.
- So an exposed bone surface is covered by a graft which has its own blood supply. Such grafts are known as flaps or pedicle grafts.

PEDICEL GRAFT OR FLAP

- Flap: Partially or completely isolated segment of tissue with its own blood supply^Q

Absolute Indications for Flaps

- | | |
|--|--|
| <ul style="list-style-type: none"> • Exposed bone^Q • Radiated vessel^Q • Brain^Q | <ul style="list-style-type: none"> • Open joint or non-biological^Q implant materials^Q • Pressure sores at bony prominences |
|--|--|

10. Ans. b. Full thickness graft

11. Ans. d. Full thickness skin graft

12. Ans. c. Streptococcus

13. Ans. a. Revascularization of the graft

14. Ans. c. Skull bone

15. Ans. c. For large areas, full thickness graft is used

16. Ans. a. Muscle (Ref: CSDT 12/e p1211)

For critical and small areas such as an eyelid, a full thickness graft is selected, so that contraction of the grafted material is minimum.

17. Ans. d. Postauricular region (Ref: CSDT 12/e p1211)

Donor Sites for Full Thickness Grafts

- | | |
|---|---|
| <ul style="list-style-type: none"> • Eyelids^Q • Postauricular skin^Q • Supraclavicular skin^Q • Antecubital skin^Q | <ul style="list-style-type: none"> • Inguinal area^Q • Genital area^Q • Submammary skin^Q • Subgluteal skin^Q |
|---|---|

18. Ans. b. Back to neck

19. Ans. b. 2 weeks (Ref: Facial Plastic and Reconstructive Surgery by Ira D. Papel/44)

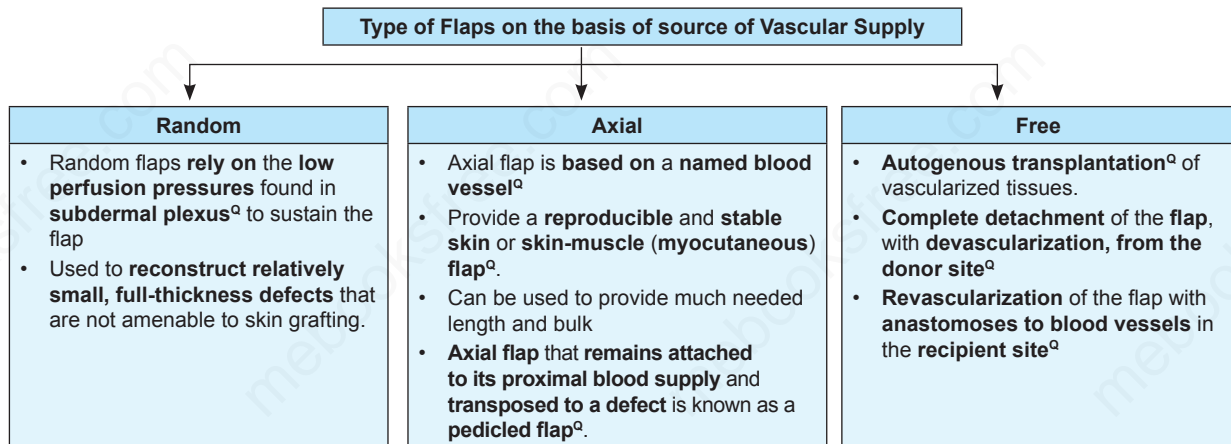
Excess split-skin autografts harvested and meshed during a surgical session are often stored at short-term for later burn surgery or graft failure.

The current procedure in skin storage involves wrapping the meshed autograft on a piece of ringier lactate or normal saline moistened gauze, transferring it into a sterile container and storing it in a 40 C for 2 weeks. The graft should never be totally immersed in saline because it will become macerated. After 14 days of storage the respiratory activity of skin graft reduced by 50%.

20. Ans. d. Autograft
 21. Ans. c. Less contraction
 22. Ans. a. Grafts are tissues that are transferred without their blood supply and they revascularise at the new site

FLAPS

23. Ans. a. Carries its own vessels within it (Ref. Sabiston 19/e p1917-1919; Schwartz 9/e p1651-1654; Bailey 26/e p404-405, 25/e p397-398)



24. Ans. a. Pedicle flap
 25. Ans. a. Lip
 26. Ans. c. Burn wound
 27. Ans. a. Randomised flaps
 28. Ans. d. Skin, muscle and vascular pedicle

MARJOLIN'S ULCER

29. Ans. b. Squamous cell carcinoma (Ref. Schwartz 10/e p259, 1817, 9/e p224, 414; Bailey 26/e p548, 25/e p611, 935)

MARJOLIN'S ULCER

- Low grade SCC^o, which develops on a **chronic benign ulcer** or a **long standing scar tissue**.
- Arises from the **edge^o** of the ulcer

Marjolin's ulcer may develop in

- | | |
|--|---|
| <ul style="list-style-type: none"> Post burn scar^o Long standing venous ulcer^o Chronic ulcer^o due to trauma | <ul style="list-style-type: none"> Chronically discharging osteomyelitis sinus^o Post-radiation ulcer |
|--|---|

Characteristic Features

- Slow growing^o** as scar tissue is **relatively avascular**
- Painless** as there **no nerves in the scar tissue^o**
- No secondary deposits^o** in regional lymph node, as there are **no lymphatic vessels** in scar tissue
- If the ulcer invades the normal tissue, then only lymph node may be involved by lymphatic spread
- Radioresistant^o** due to **avascularity**

30. Ans. a. The associated cancer is squamous cell carcinoma, b. May occur due to chronic venous insufficiency
 31. Ans. b. Squamous cell carcinoma 32. Ans. a. Ulcer over scar
 33. Ans. a. Develops in long standing scar, b. Squamous cell carcinoma develops, c. Slow growing lesion

PREMALIGNANT LESIONS OF SKIN

34. Ans. d. All of the above (Ref. Sabiston 19/e p762; Schwartz 10/e p847, 1217-1218, 9/e p413; Bailey 26/e p589, 25/e p607)

BOWEN'S DISEASE

- This is an SCC **in situ^o**, of which 3–11% progress to SCC.
- Etiological agents: Chronic solar damage, inorganic arsenic and HPV16^o**
- This is rare, **slow-growing intraepidermal SCC** that often **mimics a chronic dermatosis^o**.
- It should now be considered as a **form of AIN III** (Anal intraepithelial neoplasia).

Clinical Features

- It usually presents with pruritus^Q and on examination looks like psoriasis or senile keratosis.
- Presents as a slowly enlarging, erythematous, scaly patch or plaque^Q.

Treatment

- Topical therapy with 5-fluorouracil or imiquimod is an effective treatment^Q.
- Alternatives: Surgical excision with a 4-mm margin or Mohs' micrographic surgery^Q for larger or recurrent lesions.

35. Ans. e. All of the above

36. Ans. b. Steatoma multiplex (Ref. Sabiston 19/e p761-763; Schwartz 9/e p413; Bailey 26/e p588-589, 25/e p607-609)

Premalignant skin Lesions	
<ul style="list-style-type: none"> • Senile or actinic keratosis^Q • Bowen's disease^Q • Erythroplasia of Queyrat^Q 	<ul style="list-style-type: none"> • Chronic scars^Q • Radiodermatitis^Q • Prokeratosis^Q

SQUAMOUS CELL CARCINOMA

37. Ans. a. Long standing venous ulcers, b. Chronic lupus vulgaris (Ref. Sabiston 19/e p761-764; Schwartz 10/e p1218, 9/e p413-414; Bailey 26/e p593-594, 25/e p610-612)

SQUAMOUS CELL CARCINOMA (EPITHELIOMA OR EPIDERMOID CARCINOMA)

- It is a carcinoma of the cells of epidermis that usually migrate outwards to the surface.
- Originate from prickle cell layer^Q; Seen in > 40 years of age

- MC skin cancer in darkly pigmented races^Q
- 2nd MC skin cancer in light skinned races^Q
- MC causative factor: Sunlight^Q
- MC site: Ears, cheeks, lower lip and back of hands^Q

Predisposing Factors for SCC	
<ul style="list-style-type: none"> • Senile or actinic keratosis^Q • Chronic skin lesions (lupus vulgaris^Q, cutaneous TB) • Sunlight or irradiation^Q • Chronic irritation; HIV, HPV-16^Q 	<ul style="list-style-type: none"> • Contact with tars and hydrocarbons^Q • Erythroplasia of Queyrat^Q • Immunosuppression^Q • Psoralens, Arsenic exposure^Q

Pathology

- Microscopically mass of keratin is surrounded by normal looking squamous cells, presenting with characteristic prickle cell appearance^Q, which are arranged in concentric manner as seen in 'onion skin'. This whole appearance is called "cell nest or epithelial pearl"^Q.
- MC type of SCC: Ulcerative type^Q

Clinical Features

- MC symptom: Nodule or ulcer^Q
- Edge of ulcer: Raised and everted with indurated base (pathognomonic)^Q

Diagnosis

- Diagnosis is made by wedge biopsy^Q (taken from edge of ulcer)

Treatment

- Small (< 1 cm) or non-invasive SCC: Excision with 1 cm margin^Q
- Large, aggressive, located at vital areas or recurrent: Moh's micrographic surgery^Q

38. Ans. b. Everted

39. Ans. c. Giant condyloma accuminata (Ref. Bailey 26/e p1375, 25/e p1375)

GIANT CONDYLOMA ACUMINATUM

- Giant condyloma acuminatum (also known as a Buschke-Löwenstein tumor)^Q
- Rare cutaneous condition characterized by an aggressive, wart-like growth that is a verrucous carcinoma^Q.
- It is attributed to HPV^Q.

BASAL CELL CARCINOMA

40. Ans. a. Nodular (Ref. Sabiston 19/e p761-764; Schwartz 10/e p486-487, 9/e p413; Bailey 26/e p591-592, 25/e p609-610)

BASAL CELL CARCINOMA (RODENT ULCER)

- Locally invasive carcinoma, arises from the **basal layer**^Q of the epidermis
- MC type of skin cancer^Q
- 90% of BCC are seen in the **face**^Q, above a **line from the corner of mouth to lobule of ear**.
- MC site: Nose > Inner canthus^Q of the eye, also known as **Tear cancer**^Q.

Types of BCC

- **Nodular**: MC type of BCC^Q, characterized by small slow growing **pearly nodules**, often with **telangiectatic vessels** on its surface. **Central depression with umbilication**^Q is a classic sign.
- **Pigmented**: Mimic malignant melanoma
- **Cystic**
- **Superficial**

Characteristic Features of BCC

- | | |
|--|--|
| <ul style="list-style-type: none"> • Low grade malignancy^Q • More common in fair and dry skinned people • Nuclear palisading^Q on histology | <ul style="list-style-type: none"> • Exposure to sunlight^Q is an important etiological factor • Has been seen following prolonged administration of Arsenic^Q |
|--|--|

Spread

- BCC usually spreads by **local invasion**^Q, rarely metastasizes
- **Rodent ulcer**: It gradually **destroys the tissues**, it comes in **contact with**.
- **Lymphatic spread is not seen**^Q (Regional lymph nodes are not enlarged)
- Blood spread is extremely rare.

Diagnosis

- Diagnostic procedure for BCC is **wedge biopsy**^Q.

Treatment

- **Non-aggressive tumor on trunk or extremities**: Excision or Electrodissection and curettage^Q
- **Large, aggressive, located at vital areas or recurrent**: Moh's micrographic surgery^Q

41. Ans. a. Face

42. Ans. a. Basal cell carcinoma

43. Ans. b. Basal cell carcinoma

44. Ans. a. Wedge biopsy

45. Ans. a. Most common site is upper eyelid

46. Ans. d. Excision

47. Ans. b. Tumor less than 2 cm in diameter (Ref. Sabiston 19/e p763-764; Schwartz 10/e p486-487, 9/e p414; Bailey 26/e p592, 25/e p610)

MOH'S MICROGRAPHIC SURGERY FOR SCC AND BCC

- Mohs' technique uses **serial excision** in small increments coupled with **immediate microscopic analysis** to ensure tumor removal, yet **limit resection of aesthetically valuable tissue**^Q.
- Advantage: All specimen margins are **evaluated**^Q.

- | |
|--|
| <ul style="list-style-type: none"> • Major benefit: Ability to remove a tumor with minimal sacrifice of uninvolved tissue^Q. • Particular value in managing tumors of the eyelid, nose, or cheek^Q • Indicated in large, aggressive tumors located at vital areas or recurrent tumors^Q |
|--|

- **Major drawback: Procedure length** (Total lesion excision may require multiple attempts at resection, and many procedures may be carried out over several days)
- **Recurrence and metastases rates** are **comparable** to those of **wide local excision**^Q.

48. Ans. c. Direct spread

49. Ans. a. Spreads to local lymph nodes

50. Ans. c. Nuclear Palisading

51. Ans. b. Bilobed flap (Ref. Bailey 25/e p402)

Bilobed flap is used to cover a convex defect as on tip of nose. The bilobed flap is widely used for small nasal defects because it allows one to distribute tensions further from the primary defect, thus controlling the degree of tension along the alar margin

MALIGNANT MELANOMA

52. Ans. d. Tumors cell at junction of papillary and reticular dermis (Ref. Sabiston 19/e p742-760; Schwartz 10/e p488-492, 9/e p414-417; Bailey 26/e p594-596, 25/e p612-616)

MALIGNANT MELANOMA

- Melanoma is neoplastic disorder produced by **malignant transformation of normal melanocytes**^Q.

- Site most commonly associated** with melanocytic transformation in the skin, where melanocytes reside at the **dermo-epidermal junction (Junctional melanocytes)**^Q.
- MC site of MM in men: Back and trunk**^Q
- MC site of MM in women: Lower extremity**^Q

- Most susceptible individuals:** Fair complexions, **red or blonde hair, blue eyes and freckles** and who **tan poorly** and **sunburn easily**.
- MM is positive** for S-100, HMB-45, vimentin but **negative** for cytokeratin-20^Q.

Risk factors for Malignant Melanoma	
<ul style="list-style-type: none"> Xeroderma pigmentosum^Q Actinic damage (UVR)^Q Family history of melanoma^Q Presence of dysplastic naevus^Q 	<ul style="list-style-type: none"> Giant congenital melanocytic nevus Increased number of ordinary melanocytic naevi History of sunburn^Q

Types of Malignant Melanoma: (In order of decreasing frequency)	
Superficial spreading	<ul style="list-style-type: none"> MC type of MM^Q MC site: Torso
Nodular	<ul style="list-style-type: none"> Most malignant^Q MC site: Head, neck and trunk Vertical growth phase only
Lentigo maligna	<ul style="list-style-type: none"> Least malignant^Q MC site: Face
Acral lentiginous	<ul style="list-style-type: none"> Least common, worst prognosis^Q, MC site: Sole, under great toe nail

Characteristic Features

- Classic appearance of melanoma: ABCD** (Asymmetry, Border irregularity, Color variation, Diameter >6 mm)^Q
- MC route of metastasis:** Through **Lymphatics**^Q
- MC site of systemic metastasis:** **Liver**^Q
- Other common visceral sites of metastasis: Lung, brain, GIT (small intestine), bone, adrenal.

- Microsatellites:** Discrete tumor nests > 0.05 mm in diameter, **separated from main body of tumor by normal dermal collagen or subcutaneous fat**^Q.
- Microsatellites** are associated with **increased risk of regional LN metastasis**^Q.

Diagnosis

- Confirmed by **'full thickness excisional biopsy'**^Q
- Incisional biopsy for large lesions and lesions in proximity to important structures (eye, nose, ear)

Treatment

- Treatment: **Surgical excision**^Q with **sentinel LN biopsy** (Margin: **1 cm** for < **1 mm** thickness, **2 cm** for **1–4 mm** thickness, **2–3 cm** for > **4 mm** thickness)
- LN dissection** if LN is palpable or positive on sentinel LN biopsy
- MM is **radioresistant tumor**; **Chemotherapy: IFN-alpha 2b**

Clark's levels ^Q (on the basis of depth of invasion): EPIRS	
I	• Melanoma restricting to Epidermis and appendages ^Q
II	• Invading Papillary dermis without filling it ^Q
III	• Reach Interface of papillary and reticular dermis ^Q
IV	• Invading reticular dermis ^Q
V	• Invading subcutaneous tissue ^Q

- MM is **sub-classified** into 5 Clark levels, to indicate their **depth of invasion** and **prognosis**^Q.
- Breslow's depth of invasion:** Actual measurement of the deepest invasion from the **granular layer**^Q.

Breslow's Thickness	
Stage I	• < 0.75 mm ^a
Stage II	• 0.75–1.5 mm ^a
Stage III	• 1.6–4.0 mm ^a
Stage IV	• > 4.0 mm ^a

Prognostic Factors (Depends most importantly on staging ^a)	
<ul style="list-style-type: none"> • Depth of invasion (most important prognostic factor)^a • Ulceration^a (presence of ulceration carries worst prognosis) 	<ul style="list-style-type: none"> • Lymph node status^a • Satellite lesion^a • Distant metastasis^a

53. Ans. a. Lymphatic spread, b. Lymph node biopsy is always done, c. Biopsy to be done when sentinel node is involved, d. Microsatellitism
54. Ans. d. Diameter < 6 mm 55. Ans. d. Hair in mole 56. Ans. b. Surgical excision
57. Ans. a. Junctional melanocytes 58. Ans. a. Superficial spreading 59. Ans. a. Face
60. Ans. a. Nodular 61. Ans. a. Stage, b. Depth of melanoma of biopsy, d. Site
62. Ans. b. Acral lentiginous melanoma carries a good prognosis, c. Stage IIa shows statelite deposits
- According to latest staging, presence of satellites is included in stage III.
63. Ans. a. Melanoma, Clark level IV 64. Ans. c. Excision biopsy
65. Ans. a. Amelanotic melanoma is associated with worst prognosis, b. Complete excisional biopsy is the management, c. Thinner melanoma has good prognosis (Ref. Bailey 26/e p596, 25/e p615)

AMELANOTIC MELANOMA

- Amelanotic melanoma is a type of skin cancer in which the cells do not make melanin.
- They can be pink, red, purple or of normal skin color, hence difficult to recognize^a.
- It has an asymmetrical shape and an irregular faintly pigmented border^a.
- Atypical appearance leads to delay in diagnosis, the prognosis is bad^a.
- Recurrence rate is high^a.

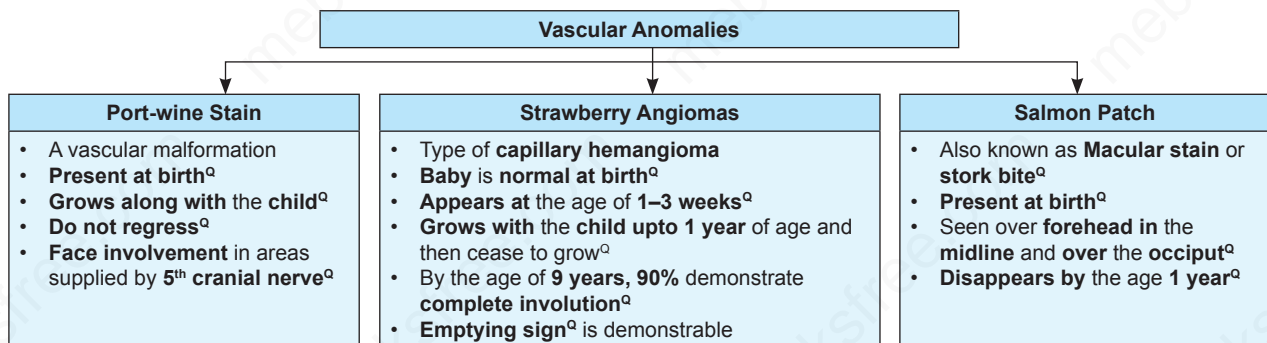
DESMOPLASTIC MELANOMA

- Desmoplastic melanoma is mostly found on the head and neck region^a.
- It has a propensity for perineural infiltration^a and often recurs locally^a if not widely excised.
- It may be amelanotic clinically^a.

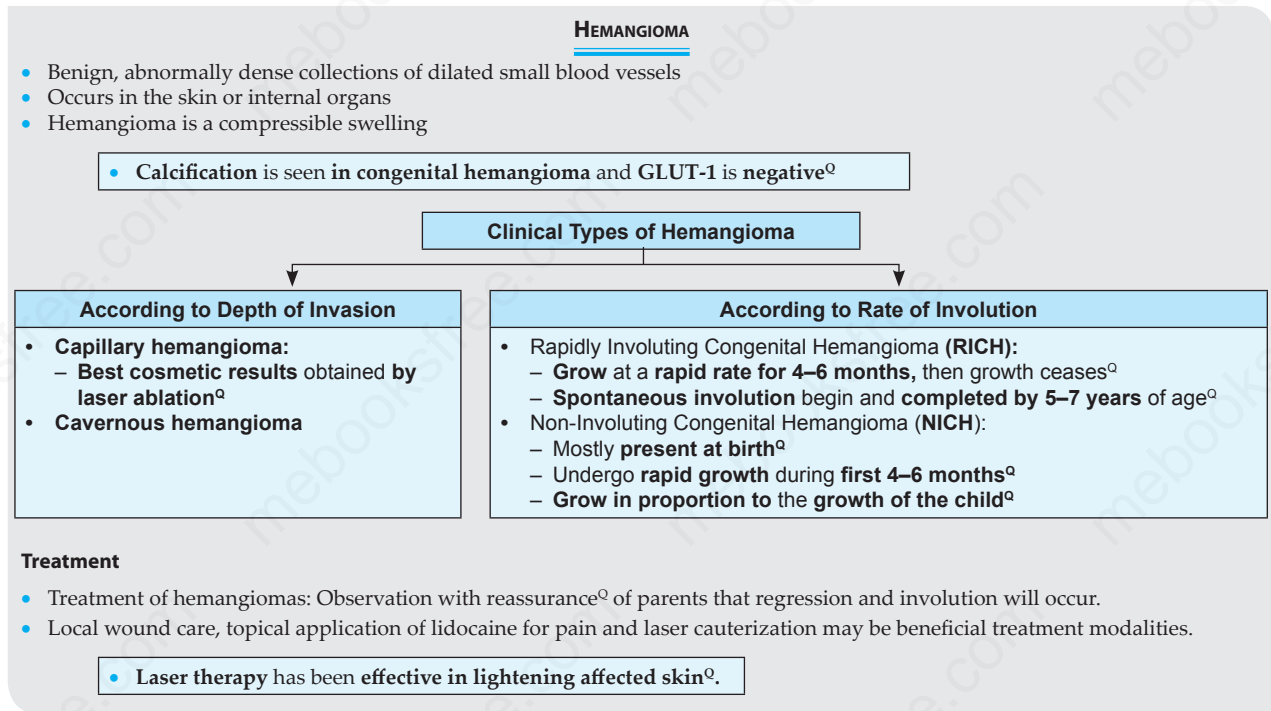
66. Ans. a. 2 cm 67. Ans. b. Nodular infiltrating type 68. Ans. c. Both
69. Ans. d. Amelanotic melanoma 70. Ans. d. Renal 71. Ans. a. Radiation
72. Ans. c. Excisional biopsy 73. Ans. b. Malignant melanoma foot
74. Ans. d. HPV infection 75. Ans. S-100

SKIN PATCH/STAIN/HEMANGIOMA

76. Ans. b. Strawberry angioma (Ref. Schwartz 10/e p485, 9/e p411-412; Bailey 25/e p616-618)



77. Ans. a. Congenital variety stops growing after birth), b. Fully mature at birth, c. NICH variety persists, d. RICH variety involutes, e. Calcification can occur (Ref. Schwartz 10/e p485, 9/e p411–412; Bailey 26/e p598–599, 25/e p616–618)



78. Ans. b. Strawberry angioma 79. Ans. c. Masterly inactivity 80. Ans. d. Argon laser treatment
 81. Ans. c. Portwine stain 82. Ans. b. One year 83. Ans. a. Strawberry angioma
 84. Ans. d. All are correct 85. Ans. b. Laser ablation
 86. Ans. d. Pulsed eye laser (Ref. Roxburgh 17/e p194, 205)

Selective photothermolysis or pulsed eye laser is the treatment of choice for portwine hemangioma.

Excellent results have been obtained with careful and time-consuming treatment with a 585-nm flash lamp-pumped pulsed eye laser. Treatment sessions can begin in babies and anesthesia is not always necessary.

87. Ans. d. Intracranial hamartoma (Ref. Bailey 26/e p599, 25/e p618)

STURGE-WEBER SYNDROME / ENCEPHALOTRIGEMINAL SYNDROME

- Usually sporadic, characterized by:
 - Large **unilateral cutaneous angioma^Q** (port-wine stain)
 - Angiomas in brain** involving **ipsilateral cerebral hemisphere** and meninges
 - Focal seizures^Q** typically occurs **opposite to the side of lesion^Q**
 - Adrenal **pheochromocytoma**
 - Cerebral angiomas lead to **cortical atrophy^Q**

- Angiomas are visible radiologically as **Tram-track or rail track calcification** mainly in **occipital region^Q**

88. Ans. c. Portwine stain 89. Ans. b. Strawberry hemangioma

SEBACEOUS CYST

90. Ans. d. Sole (Ref. Schwartz 10/e p1218, 9/e p411; Bailey 25/e p1390, 25/e p602, 647)

EPIDERMOID CYST (SEBACEOUS OR EPIDERMAL CYST)

- Epidermoid cyst results from **proliferation of epidermal cells** within a circumscribed space of dermis (which had got **implanted within the dermis^Q**)
- Sebaceous cyst** is a **misnomer** as the cysts are **not of sebaceous origin** and the **white creamy material** filled within is not sebum, but is **keratin (desquamated epithelial cells^Q)**
- Type of retention cyst** (secretions are pent up in a gland owing to blockage of the duct)

Pathology

- Cyst wall consist of a **layer of epidermis** oriented with the basal layer superficial and more matured layers are deep.
- **Desquamated cells (keratin)** collect in the centre and form creamy substance of the cyst.

Clinical Features

- Usually **asymptomatic**^Q, unless get infected or inflamed and become painful
 - **Firm, round, flesh colored** to yellow or white subcutaneous nodules of variable size.
 - **Central punctum**^Q may tether the cyst to the overlying epidermis, from which the white creamy material can be expressed.
 - Rarely **malignancies**^Q (BCC, SCC) can develop in epidermoid cyst.
- **No punctum in scrotal and scalp sebaceous cyst**^Q.

Treatment

- **Excision with the wall** is treatment of choice^Q.
- **Infected cyst: Incision and drainage** (After resolution of the abscess, **cyst wall must be excised to prevent recurrence**)^Q

91. Ans. a. Punctum is present, b. Keratin is present, e. May turn malignant

92. Ans. b. Retention cyst

93. Ans. a. Infected sebaceous cyst

94. Ans. c. Ulcerated sebaceous cyst

LIPOMA

95. Ans. d. Lipoma (Ref. Sabiston 19/e p1258; Schwartz 10/e p486, 9/e p413; Bailey 26/e p536, 985, 25/e p503, 1007)

LIPOMA

- **MC subcutaneous neoplasm: Lipomas**^Q
- **MC site: Trunk**^Q (may appear anywhere)
- Other sites: Subcutaneous, Subfascial, subsynovial, intra-articular, intramuscular, subserous, submucous, CNS, intraglandular and reteroperitoneal
- Can be **encapsulated** or **diffuse**

- Also known as **universal tumor**^Q

Pathology

- **Lobulated tumor** composed of **normal fat cells**

Clinical Features

- Typically **soft** and **fleshy** on palpation
- May grow to a **large size** and become substantially deforming.

- **Bracket calcification** is seen in lipoma of corpus callosum^Q

Treatment:

- **Surgical excision**^Q is required for tumor removal

96. Ans. c. Back (Ref. http://en.wikipedia.org/wiki/Adiposis_dolorosa)

ADIPOSI DOLOROSA (DERCUM'S DISEASE)

- A **rare condition** characterized by **multiple, painful lipomas**^Q.
- These lipomas **mainly occur on the trunk, upper arms** and upper legs.
- Mostly occur between **35–50 years**, more common in **women**

Clinical Features

- **Multiple lipomas** and **neuropathic pain** are the **cardinal symptoms**^Q

Treatment

- Treatment is usually targeted towards **pain relief**^Q rather than lipoma removal.

97. Ans. b. Retro-peritoneal (Ref. Sabiston 19/e p1258; Schwartz 9/e p413; Bailey 26/e p985, 25/e p1007)

RETROPERITONEAL LIPOMA

- These swellings sometimes reach an **immense size**^Q.
- **Retroperitoneal lipoma** is **often malignant** (liposarcoma) and **may increase rapidly in size**^Q.

- A **retroperitoneal lipoma** sometimes undergoes **myxomatous degeneration**^Q
 - A complication that **does not occur in a lipoma in any other part of the body**^Q

Clinical Features

- Swelling or indefinite abdominal pain
- More common in women

Diagnosis

- Diagnosis is usually by ultrasound and CT scanning.

98. Ans. b. Tender subcutaneous lipomas

99. Ans. d. Retroperitoneum

HIDRADENITIS SUPPURATIVA

100. a. Axilla, b. Circumanal, d. Groin (Ref. Sabiston 19/e p1398-1399; Schwartz 10/e p476,506,1233, 9/e p409-410; Bailey 26/e p582, 25/e p597-598)

HIDRADENITIS SUPPURATIVA

- Hidradenitis suppurativa is a defect of the **terminal follicular epithelium**^Q
- Follicular defect results in **apocrine gland blockage**, **obstructed infection** leads to **abscess formation** throughout affected **axillary^Q, inguinal^Q and perianal regions^Q**.
- Following spontaneous rupture of these localized collections, **foul-smelling sinuses** form and **repeated infections** create a **wide area of inflamed, painful tissue^Q**.

Treatment

- **Acute infections:** Application of **warm compresses**, **antibiotics** and **open drainage^Q**
- **Chronic Hidradenitis:** **Wide excision** and **skin grafting^Q**

KERATOACANTHOMA

101. Ans. c. Self healing nodular lesion with central ulceration (Ref. Bailey 26/e p590, 25/e p607)

KERATOACANTHOMA

- Keratoacanthoma is **self healing nodular lesion with central ulceration^Q**
- More common in **men**, usually found **on the face** of **50–70 years old**.
- Lesions can **grow to 1–3 cm over 6 weeks** and typically **resolve spontaneously** over the **subsequent 6 months^Q**.

Etiopathogenesis

- Classically a **cup-shaped growth** that exhibits symmetry about its middle.
- **Central crater** is filled with a **plug of keratin^Q**.
- **Unclear etiology** (may be caused by **HPV infecting a hair follicle**)
- Associated with smoking and **chemical carcinogen exposure**.

Treatment

- **Removal of central keratin plug** may **speed resolution^Q**.
- **Excision** is recommended **for persistent lesions^Q**
- **Excision scar** is often **better** than that which remains after resolution.

102. Ans. a. Benign tumor, e. Treatment is masterly inactivity

MISCELLANEOUS

103. Ans. e. All of the above

104. Ans. d. Skin

105. Ans. c. Exudation

106. Ans. d. Pilomatrixoma

Cocks Peculiar Tumour	<ul style="list-style-type: none"> • Infected or ulcerated sebaceous cyst of the scalp^Q • Resembles fungating epithelioma^Q
Potts Puffy Tumour	<ul style="list-style-type: none"> • Osteomyelitis of the Frontal bone of skull^Q • Associated with subperiosteal swelling and edema^Q
Pilomatrixoma	<ul style="list-style-type: none"> • Also known as Calcifying epithelioma of Malherbe^Q • Benign hair follicle derived tumor^Q
Cylindroma	<ul style="list-style-type: none"> • A malignant epithelial tumour also known as Turban tumor^Q • Known as cylindroma because of histological appearance

107. Ans. d. Palm

108. Ans. b. Slow rewarming (Ref. Bailey 25/e p393; <http://en.wikipedia.org/wiki/frostbite>)**FROSTBITE**

- Frostbite injuries affect the peripheries in cold climates.
- The initial treatment is with slow rewarming^o in a bath at 42 °C.
- The cold injury produces delayed microvascular damage.
- Level of damage is difficult to assess.
- Surgery usually does not play a role in its management, until there is absolute demarcation of the level of injury.

109. Ans. a. Steroids (Ref. Bailey 25/e p598; http://en.wikipedia.org/wiki/Pyoderma_gangrenosum)**PYODERMA GANGRENOSUM**

- Relatively uncommon destructive cutaneous lesion.
- Clinically, a rapidly enlarging, necrotic lesion with undermined border and surrounding erythema characterize this disease.
- Commonly associated with IBD, rheumatoid arthritis, hematologic malignancy and monoclonal immunoglobulin A gammopathy.

Treatment

- First-line therapy: Systemic treatment by corticosteroids and cyclosporine^o.
- If ineffective, alternative therapeutic procedures include systemic treatment with corticosteroids and mycophenolate mofetil; mycophenolate mofetil and cyclosporine.

110. Ans. a. Polypropylene

111. Ans. a. Appendage tumor

112. Ans. a. Vascular pathology, c. Increased in pregnancy, d. Local excision (Ref. Bailey 25/e p618; Roxburgh 17/e p197)

PYOGENIC GRANULOMA

- Relatively common vascular lesion of skin and mucosa
- The name is misnomer (it is neither a granuloma, nor pyogenic in origin)
- Most are small (0.5–1.5 cm), raised, pedunculated, soft, red nodular lesions showing superficial ulceration and a tendency to bleed after trivial trauma^o.
- Often arise in pregnancy particularly on gingiva^o or elsewhere in oral mucosa

Treatment

- Local excision with a minimal margin.

113. Ans. d. Lines of development (Ref. Neurocutaneous Disorders by Ruggieri (2008)/364)

Lines of Blaschko represents random line of development of skin.

114. Ans. b. Trophic ulcer

115. Ans. c. Base of toe (Ref. Bailey 25/e p914)

AINHUM

- Ainhum is a disease of unknown etiology
- Usually affects black men^o (and occasionally women) who have run barefoot in childhood^o.
- It is recorded in central Africa, central America and the Orient.
- A fissure appears at the level of the interphalangeal joint of a toe, usually of the little toe^o.
- Fissure is followed by a fibrous band that encircles the digit and causes necrosis^o.

Treatment

- Early stage: Z-plasty^o; Later stage: Amputation^o

116. Ans. d. Bone (Ref. Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)

Bone is the first structure to be fixed in hand injuries.

SEQUENCE OF REPAIR IN HAND INJURIES (BE FAN OF VEINS)

- | | |
|--|--|
| 1. Bone shortening and stabilization/fixation ^o | 2. Extensor tendon repair ^o |
| 3. Flexor tendon repair ^o | 4. Arterial anastomoses ^o |
| 5. Nerve repair ^o | 6. Venous anastomosis ^o |
| 7. Skin/wound closure ^o | |

117. Ans. a. Leprosy, c. Syringomyelia (Ref. Sabiston 19/e p1943-1945; Bailey 26/e p80, 25/e p537)

NEUROPATHIC FOOT/TROPHIC ULCERS

- Also called **Trophic ulcers** or **penetrating ulcers**^Q
- Presence of neuropathic ulcer **on the sole or heel** of the foot^Q.

Basic Defect

- **Loss of sensation** due to **neurological disorder**^Q.
- Ulcer occurs due to **repeated injury or pressure**^Q.

Causes of Trophic ulcers

- | | |
|--|---|
| <ul style="list-style-type: none"> • Diabetes^Q • Leprosy^Q • Tabes dorsalis^Q • Atherosclerosis | <ul style="list-style-type: none"> • Syringomyelia^Q • Paraplegia^Q • Infection |
|--|---|

Clinical Features

- Presence of neuropathic ulcer **on the sole or heel** of the foot^Q.
- **Painless and non-tender ulcer**^Q
- **Surrounding tissues** are **healthy** and have a **normal circulation** but are **unable to appreciate pain**^Q.
- Evidence of **neurological deficits** is present, e.g. loss of diminution of sensation, weakness of the muscles, claw foot.
- **Peripheral pulses** are usually **present**. **Peripheries** are **cold and dry**.

118. Ans. a. Viral warts spontaneously resolve, c. Callosity are formed occupationally (Ref. Sabiston 19/e p1402; Schwartz 10/e p485, 1233, 9/e p410; Bailey 25/e p1266)

Corn and callosities are hyperkeratosis due to chronic excessive pressure or friction on the skin.

WARTS

- Warts are epidermal growths associated with **HPV infection**^Q
- Histologically characterized by: **Hyperkeratosis, acanthosis, papillomatosis and koilocytes**
- **Recurrences** are common
- Some warts are **risk factors for SCC**^Q.

Treatment

- Removed by number of chemical including **formalin, podophyllin** etc^Q.
- **Surgical excision or curettage with electrodissection**^Q can also be done.
- Treatment of extensive areas of skin requires surgical excision under GA.

119. Ans. b. Tubercular ulcer

120. Ans. d. Apoplectic cyst (Ref. Bailey 24/e p209)

CYST

- Cyst is a sac that is filled with a fluid or semi-fluid material.
- Two of the most common types of cyst that occur under the skin surface are **sebaceous cyst** and **dermoid cyst**. These are **true cyst**, line by **epithelium**.
- **Pseudocyst of pancreas** and **apoplectic cyst** are **not lined by epithelium**, and are **not true cyst**^Q.

121. Ans. c. A benign epithelial tumor

122. Ans. c. Granulation tissue (Ref. Bailey 26/e p580, 25/e p595-596)

- A **sinus** is a **blind-ending tract** that **connects a cavity lined with granulation tissue** (often an abscess cavity) with an epithelial surface.

123. Ans. c. Malignant

124. Ans. b. Resection of complete nail with part of nail bed (Ref. Orthopedics and Fractures by T. Duckworth, C. M. Blundell (2010)/215)
Zadek's procedure is resection of complete nail with part of nail bed in ingrowing toe-nail.

ZADEK'S PROCEDURE

- For recurrent problems in ingrowing toe-nail, the **toenail** and its **growing point** removed so that the **nail does not ever re-grow** (Zadek's procedure)^Q.

125. Ans. c. Hemangioma

126. Ans. c. Bipedicle flap (Ref. Bailey 26/e p408, 25/e p403)

LOCAL FLAPS

- A local flap is raised next to a tissue defect in order to reconstruct it.

Basic patterns of Local Flaps	
Transposition flap	• Most basic design , leaving a graftable donor site
Z-plasty	• For lengthening scars or tissues
Rhomboid flap	• For cheek, temple, back and flat surface defects
Rotation flap	• For convex surfaces
Advancement flap	• For flexor surfaces ; may need triangles excised at the base to make it work (commonly called Burrow's triangles)
V-to-Y advancement	• Commonly used for fingertips and extremities
Bilobed flap	• For convex surfaces, especially the nose ^Q
Bipedicle flap	• For eyelids , rarely elsewhere ^Q .

127. Ans. d. Rodent ulcer (Ref. <http://emedicine.medscape.com/article/276624-treatment#a02aab6b6b4>)

- Among the given options, only rodent ulcer (BCC) is radiosensitive, rest all are not responsive to radiotherapy.

128. Ans. a. Osteo myelitis of the frontal bone

Wound Healing, Tissue Repair and Scar

MULTIPLE CHOICE QUESTIONS

WOUND HEALING

- Wound healing is affected by:** (PGI Dec 2007)
 - Age
 - Nutrition
 - Dryness or wetness of wound
 - Drugs
 - Temperature
- Prevention of wound infection is done by:** (PGI June 2005)
 - Pre-op shaving
 - Pre-op antibiotic therapy
 - Monofilament suture
 - Wound apposition
- True about wound healing:** (PGI June 2009)
 - Infected wound heal by primary intention
 - Deep dermal wound heal by scar formation
 - Wound contraction is found in healing by secondary intention
 - More intense inflammatory response in primary intention
- True about chronic wound:** (PGI Nov 2009)
 - Found in DM
 - Always require surgical treatment
 - May be associated with vascular compromise
 - Monofilament sutures prevent infection
 - Any wound that does not heal within 3 month
- Cell not involved in healing of clean wound:** (PGI Nov 2011)
 - Macrophages
 - Platelet
 - Fibroblasts
 - Polymorphonuclear leukocytes
 - Myofibroblasts
- Management of an open wound seen 12 hours after the injury:** (DPG 2011)
 - Suturing
 - Debridement and suture
 - Secondary suturing
 - Heal by granulation
- The vitamin which has inhibitory effect on wound healing is:** (MAHE 2005)
 - Vitamin A
 - Vitamin E
 - Vitamin C
 - Vitamin B-complex
- The tensile strength of the wound starts and increases after:** (WBPG 2012, MAHE 2005)
 - Immediate suture of the wound
 - 3–4 days
 - 7–10 days
 - 6 months
- In a sutured surgical wound, the process of epithelialization is completed within:** (UPSC 2007)
 - 24 hours
 - 48 hours
 - 72 hours
 - 96 hours
- Factors that may adversely affect the healing of wounds include all the following except:**
 - Exposure to UV light
 - Exposure to radiation
 - Obstructive jaundice
 - Advanced neoplasia
- Primary closure of incised wounds must be done within:** (Kerala 87)
 - 2 hours
 - 4 hours
 - 6 hours
 - 12 hours
 - 16 hours
- The tensile strength of wound reaches that of normal tissue by:** (PGI 88)
 - 6 weeks
 - 2 months
 - 4 months
 - 6 months
- Following are required for wound healing except:** (All India 93)
 - Zinc
 - Copper
 - Vitamin C
 - Calcium
- Patient has lacerated untidy wound of the leg and attended the casualty after 2 hours. His wound should be:** (AIIMS 84)
 - Sutured immediately
 - Debrided and sutured immediately
 - Debrided and sutured secondarily
 - Cleaned and dressed
- When is the maximum collagen content of wound tissue?** (PGI 81, Rohtak 87)
 - Between 3rd to 5th day
 - Between 6th to 17th day
 - Between 17th to 21st day
 - None of the above
- A patient with grossly contaminated wound presents 12 hours after an accident, his wound should be managed by:** (UPSC 96)
 - Thorough cleaning and primary repair
 - Thorough cleaning with debridement of all dead and devitalized tissue without primary closure
 - Primary closure over a drain
 - Covering the defect with split skin graft after cleaning
- Delayed wound healing is seen in all except:** (APPG 96)
 - Malignancy
 - Hypertension
 - Diabetes
 - Infection
- In the healing of clean wound the maximum immediate strength of the wound is reached by:**
 - 2–3 days
 - 4–7 days
 - 10–12 days
 - 13–18 days
- A clean incised wound heals by:** (DPG 92)
 - Primary intention
 - Secondary intention
 - Excessive scarring
 - None of the above

20. Which one of the following surgical procedures is considered to have a clean-contaminated wound?

- Elective open cholecystectomy for cholelithiasis
- Herniorrhaphy with mesh repair
- Lumpectomy with axillary node dissection
- Appendectomy with walled off abscess

21. Fibroblasts in healing wound are derived from:

(UPSC 2008, PGI 98)

- Local mesenchyme
- Epithelium
- Endothelium
- Vascular fibrosis

22. Tensile strength of wound becomes normal after:

(Recent Question 2013)

- 6 weeks
- Never
- 4 months
- 6 months

KELOID AND HYPERTROPHIC SCAR

23. True statement(s) regarding hypertrophic scar:

(PGI Dec 2008)

- Grow beyond wound margin
- More common in female
- Not familial
- Rarely subsides
- Not race related

24. All are true about keloid except:

(PGI Dec 2007)

- Grows beyond wound margin
- Excess collagen deposition
- Precancerous leading to cancer
- More common in female
- Whites are at high risk

25. Most common site of hypertrophic keloid is:

(AIIMS Nov 93)

- Face
- Leg
- Presternal area
- Arm

26. First line treatment for keloid is:

(Recent Question 2015, AIIMS Dec 94)

- Intralesional injection of keloid
- Local steroid
- Radiotherapy
- Wide excision

27. Drug used for intralesional injection keloid is:

(AIIMS June 95)

- Prednisolone
- Triamcinolone
- Androgen
- Hydrocortisone

28. Keloid scar is made up:

- Dense collagen
- Loose fibrous tissue
- Granulomatous tissue
- Loose areolar tissue

29. What is true about keloids?

(JIPMER 95)

- It appears immediately after surgery
- It appears a few days after surgery
- It is limited in its distribution
- It is common in old people

30. Keloid is best treated:

(UPSC 95, 2001)

- Intralesional injection of trimacinolone
- Wide excision and grafting
- Wide excision and suturing
- Deep X-ray therapy

31. The following statement about keloid is true:

- They do not extend into normal skin
- Local recurrence is common after excision
- They often undergo malignant change
- They are more common in whites than in blacks

32. The worst position for scars is:

(PGI 88)

- Back
- Shoulder
- Sternum
- Abdomen

33. Keloid formation is not seen over:

(DNB 2004, 2001)

- Ear
- Face
- Eyelids
- Neck

MISCELLANEOUS

34. The best scars are seen in:

(PGI 88)

- Infants
- Children
- Adults
- Very old people

35. If suture marks are to be avoided, skin sutures should be removed by:

(JIPMER 81, AMC 89)

- 72 hours
- 1 week
- 2 weeks
- 3 weeks

36. Degloving injury is:

(Kerala 2000)

- Surgeon made wound
- Lacerated wound
- Blunt injury
- Avulsion injury

37. In treatment of hand injuries, the greatest priority is:

(All India 96)

- Repair of tendons
- Restoration of skin cover
- Repair of nerves
- Repair of blood vessels

38. During the surgical procedure:

(AIIMS 83)

- Tendons should be repaired before nerves
- Nerves should be repaired before tendons
- Tendons should not be repaired at the same time
- None is true

39. 'Lims salvage' primarily depends on:

(AIIMS 97)

- Vascular injury
- Skin cover
- Bone injury
- Nerve injury

40. In an open injury during toileting and debridement, muscle viability is detected by:

(PGI June 2003)

- Colour of the muscle
- Muscle size
- Muscle function
- Muscle contractility
- Punctate bleeding spots on cut edge

41. Criteria for viability of muscle are all except:

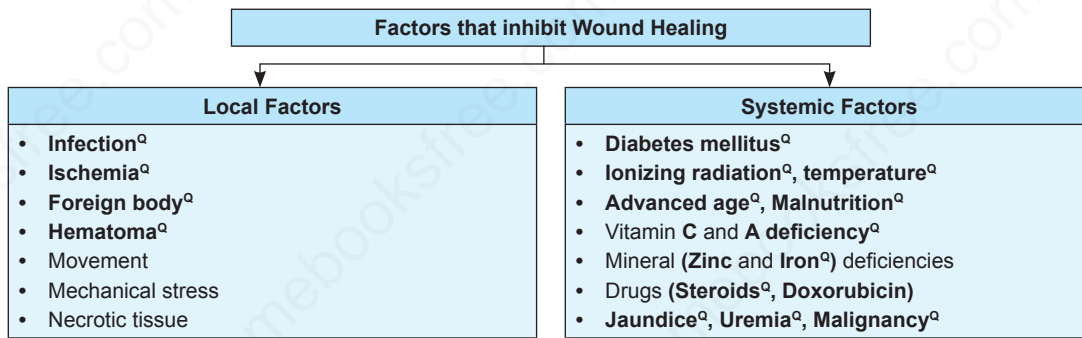
(Recent Question 2014)

- Colour
- Intact fascia
- Contractibility
- Bleeding on cutting

EXPLANATIONS

WOUND HEALING

1. Ans. a. Age; b. Nutrition; d. Drugs; e. Temperature (Ref: Sabiston 19/e p151-164; Schwartz 10/e p241-268, 9/e p219; Bailey 26/e p24, 25/e p24; Robbins 8/e p106)



2. Ans. b. Pre-op antibiotic therapy; c. Monofilament suture; d. Wound apposition (Ref: Bailey 26/e p62, 25/e p42)

- Bailey says "Preoperative shaving should be avoided except for aesthetic reasons or to prevent adherence of dressings^Q. If it is to be undertaken, it should be undertaken immediately before surgery as the SSI rate after clean wound surgery may be doubled if it is performed the night before, because minor skin injury enhances superficial bacterial colonization^Q. Cream depilation is messy and hair clipping is best, with the lowest rate of infection^Q."

Avoiding Surgical Site Infections
<ul style="list-style-type: none"> • Staff should always wash their hands between patients^Q • Length of patient stay should be kept to a minimum^Q • Preoperative shaving should be avoided if possible^Q • Antiseptic skin preparation^Q should be standardized • Bowel preparation for intra-abdominal surgeries^Q • Pre-operative antibiotics given IV at the time of induction^Q • Attention to theatre technique and discipline • Avoid hypothermia perioperatively and ensure supplemental oxygenation in recovery^Q • Monofilament sutures are used over polyfilament sutures to prevent infection^Q • Proper apposition of the wound and prevention of any dead space and hematoma^Q

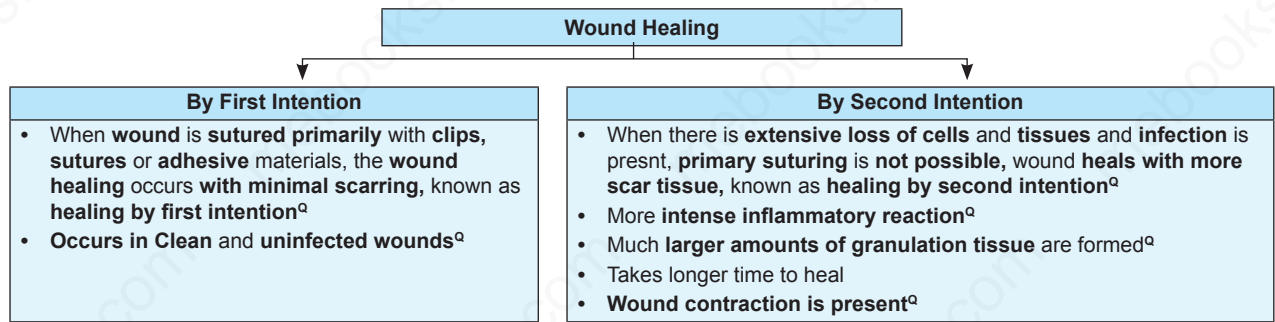
3. Ans. b. Deep dermal wound heal by scar formation; c. Wound contraction is found in healing by secondary intention (Ref: Sabiston 19/e p151-164; Schwartz 10/e p234, 1820, 9/e p210-214; Bailey 26/e p24-25, 25/e p24-25; Robbins 8/e p102-106)

CUTANEOUS WOUND HEALING

- Epidermal appendages do not regenerate^Q
- There remains a connective tissue scar in place of the mechanically efficient meshwork of collagen in the unwounded dermis.
- Very superficial wounds: Little scar formation^Q.
- In marked contrast with wound healing in adults, fetal cutaneous wounds heal without scar formation^Q, up to mid-gestation age in some animals. These wounds show little inflammation and practically no fibrosis^Q.

Cutaneous wound healing is divided into three phases

- Inflammation (early and late)
- Granulation tissue formation and re-epithelialization
- Wound contraction, ECM deposition and remodeling



4. Ans. a. Found in DM; c. May be associated with vascular compromise; d. Monofilament sutures prevent infection; e. Any wound that does not heal within 3 month (Ref: Bailey 26/e p28, 25/e p28)

CHRONIC WOUND

- Wounds that do not heal within 3 months^Q are often considered chronic.
- Surgical treatment is only indicated if non-operative treatment has failed or if the patient suffers from intractable pain^Q

5. Ans. b. Platelet; e. Myofibroblasts (Ref: Sabiston 19/e p151-164; Schwartz 10/e p234,1820, 9/e p210-214; Bailey 26/e p24-25, 25/e p24-25; Robbins 8/e p102-106)

CUTANEOUS WOUND HEALING

- Wound contraction:** Most clearly differentiates primary from secondary healing^Q
- Permanent wound contraction** requires the action of myofibroblasts, altered fibroblasts that have the ultrastructural characteristics of smooth muscle cells^Q.
- Contraction of these cells** at the wound site decreases the gap between the dermal edges of the wound.

HEALING BY FIRST INTENTION (WOUNDS WITH OPPOSED EDGES)

- Healing of a clean, uninfected surgical incision approximated by surgical sutures is referred as primary union or healing by first intention^Q.
- Narrow incisional space** immediately fills with clotted blood containing fibrin and blood cells; dehydration of the surface clot forms the well-known scab that covers the wound.

- Within 24 hours, neutrophils appear at the margins of the incision, moving toward the fibrin clot.
 - In 24–48 hours, spurs of epithelial cells move from the wound edges^Q along the cut margins of the dermis, depositing basement membrane components as they move.
 - By day 3, the neutrophils have been largely replaced by macrophages^Q. Granulation tissue progressively invades the incision space.
- By day 5, the incisional space is filled with granulation tissue^Q. Neovascularization is maximal
- During the second week, there is continued accumulation of collagen and proliferation of fibroblasts^Q. The leukocytic infiltrate, edema, and increased vascularity have largely disappeared.
- By the end of the first month, the scar is made up of a cellular connective tissue devoid of inflammatory infiltrate, covered now by intact epidermis^Q.

6. Ans. b. Debridement and suture (Ref: Sabiston 19/e p245; Schwartz 10/e p234,1820, 9/e p219; Bailey 25/e p25-27; Robbins 8/e p102)

- If the blood supply to the wound is adequate and bacterial invasion is absent, wound can be safely closed anytime following proper debridement and irrigation^Q.

- If there is established infection and tissue of doubtful viability has been left in-situ, then the wound is left open and re-explored after 48 hours^Q.
 - If there is infection, and the doubtful viable tissue is now healthy, the deep tissues can be repaired and the wound is closed^Q.
 - If however there is further necrosis and infection, the wound is again debrided and left open^Q.

7. Ans. b. Vitamin E

8. Ans. b. 3–4 days

9. Ans. b. 48 hours

10. Ans. a. Exposure to UV light

11. Ans. c. 6 hours (Ref: Sabiston 19/e p245; Schwartz 9/e p219; Bailey 26/e p25-27, 25/e p25-27; Robbins 8/e p102-104)

WOUNDS CAN BE CLOSED BY

- **Primary suture:**
 - Clean wounds^Q
 - Selected contaminated wounds after thorough wound toileting and debridement^Q
- **Delayed primary suture:**
 - Heavily contaminated wounds^Q
 - Wounds in which wound toileting has been delayed for 6–8 hours^Q
- Left open to heal by secondary closure

12. Ans. None (Ref: Sabiston 19/e p163-164; Schwartz 9/e p214; Bailey 25/e p24; Robbins 8/e p105-106)

The tensile strength of wound never equals that of unwounded skin.

WOUND STRENGTH

- At the end of the 1st week, wound strength is approximately 10% of that unwounded skin^Q.
- Strength increases rapidly over the next 4 weeks^Q.

- This rate of increase then slows at approximately the **third month** after the original incision, and reaches a plateau at about 70–80% of the **tensile strength^Q** of unwounded skin, a condition that may persist for life.
- The **recovery of tensile strength** results from the **excess of collagen synthesis** over collagen degradation during the first two months of healing and later from **structural modification of collagen fibres^Q** (cross linking, increased fiber size) after collagen synthesis ceases.

13. Ans. None 14. Ans. b. Debrided and sutured immediately

15. Ans. c. Between 17th to 21st day

- Over the first three weeks, strength and collagen content both increases but after 21 days collagen content remain static and only wound strength increases^Q.

16. Ans. b. Thorough cleaning with debridement of all dead and devitalized tissue without primary closure

17. Ans. b. Hypertension

18. Ans. d. 13–18 days

19. Ans. a. Primary intention

20. Ans. a. Elective open cholecystectomy for cholelithiasis

21. Ans. a. Local mesenchyme

22. Ans. b. Never

KELOID AND HYPERTROPHIC SCAR

23. Ans. c. Not familial; e. Not race related (Ref: Sabiston 19/e p164-165; Schwartz 10/e p261-263, 9/e p225-227; Bailey 26/e p30, 25/e p30-31; Robbins 8/e p106-107)

Feature	Hypertrophic scar	Keloid
Genetic	Not familial ^Q	May be familial ^Q
Race	Not race related ^Q	Black ^Q > white
Sex	Female = male	Female ^Q > male
Age	Children ^Q	10–30 years ^Q
Border	Remains within wound ^Q	Outgrows wound area
Natural History	Subsides with time	Rarely subsides
Site	Flexor surfaces ^Q	Sternum (MC ^Q), shoulder, face
Etiology	Related to tension ^Q	Unknown
Develop	Within 4 weeks	3 months to year after trauma

24. Ans. c. Precancerous leading to cancer; e. Whites are at high risk (Ref: Sabiston 19/e p164-165; Schwartz 10/e p261-263, 9/e p225-227; Bailey 26/e p30, 25/e p30-31; Robbins 8/e p106-107)

KELOIDS

- Keloids: Scars that grow beyond the borders of the original wounds, and rarely regress with time.
 - More prevalent in blacks^Q
 - Keloids appear to have a genetic predisposition^Q.
 - Keloid scars tend to occur above the clavicles, on the trunk, on the upper extremities, and on the face.
- Keloids have thicker, more abundant collagen bundles that form acellular node like structures in the deep dermal portion of the keloid lesion^Q.
 - Often refractory to medical and surgical intervention^Q.

25. Ans. c. Presternal area

26. Ans. a. Intralesional injection of keloid (Ref: Bailey 26/e p30, 25/e p30)

TREATMENT OF HYPERTROPHIC AND KELOID SCARS

- Pressure: local moulds or elasticated garments^Q
- Intralesional steroid injection (triamcinolone^Q)
- Excision and postoperative radiation^Q (external beam or brachytherapy)
- Intralesional excision (keloids only^Q)
- Laser: To reduce redness (which may resolve in any event)
- Vitamin E or palm oil massage (unproven)
- Silicone gel sheeting
- Excision and steroid injection^Q
- (All excisions have high rates of recurrence^Q)

27. Ans. b. Triamcinolone

28. Ans. a. Dense collagen

29. Ans. b. It appears a few days after surgery

30. Ans. a. Intralesional injection of triamcinolone

31. Ans. b. Local recurrence is common after excision

32. Ans. c. Sternum

33. Ans. c. Eyelids

MISCELLANEOUS

34. Ans. d. Very old people

35. Ans. b. 1 week (Ref: Bailey 26/e p31, 25/e p31)

- Suture marks may be minimised by using monofilament sutures that are removed early (3–5 days)^Q.
- Sutures inserted under tension will leave marks^Q.
- The wound can be strengthened post suture removal by the use of sticky strips.
- Fine sutures (6/0 or smaller) placed close to the wound margins tend to leave less scarring^Q.
- Subcuticular suturing avoids suture marks either side of the wound or incision^Q.

36. Ans. d. Avulsion injury (Ref: Bailey 26/e p27, 25/e p27)

- Degloving occurs when the skin and subcutaneous fat are stripped by avulsion from its underlying fascia, leaving neurovascular structures, tendon or bone exposed^Q.

37. Ans. d. Repair of blood vessels

38. Ans. a. Tendons should be repaired before nerves (Ref: Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)

SEQUENCE OF REPAIR IN HAND INJURIES (BE FAN OF VEINS)

- Bone shortening and stabilization/fixation^Q
- Arterial anastomoses^Q
- Skin/wound closure^Q
- Extensor tendon repair^Q
- Nerve repair^Q
- Flexor tendon repair^Q
- Venous anastomosis^Q

39. Ans. a. Vascular injury

40. Ans. a. Colour of the muscle; d. Muscle contractility; e. Punctate bleeding spots on cut edge (Ref: Bailey 25/e p354-356)

MUSCLE VIABILITY IS DETECTED BY '4C'

- Colour^Q: Dead muscle has dark unhealthy colour, has lost its sheen
- Contractility^Q: Dead muscles do not twitch when held by forceps.
- Consistency^Q: Dead muscle has lost its turgor and is mushy in consistency
- Capillary bleeding^Q: Dead muscle does not bleed at cut ends.

41. Ans. c. Contractibility

SECTION 7

NEUROSURGERY

CHAPTERS

- ❖ Cerebrovascular Diseases
- ❖ CNS Tumors

Cerebrovascular Diseases

MULTIPLE CHOICE QUESTIONS

BERRY ANEURYSM

- The most common site of Berry aneurysm is: (All India 94)
 - Junction of anterior communicating artery with anterior cerebral artery
 - Junction of posterior communicating artery with internal carotid artery
 - Bifurcation of middle cerebral artery
 - Vertebral artery
- All are common sites of berry aneurysm, except: (AIIMS June 93)
 - Posterior cerebral artery
 - Vertebral artery
 - Anterior cerebral artery
 - Middle cerebral artery
- True about berry-aneurysm is following except: (PGI June 2000)
 - Associated with familial syndrome
 - Most common site of rupture is apex which causes SAH
 - Wall contains smooth muscle fibroblasts
 - 90% occurs at anterior part of circulation at branching point
- Most common presentation of intracranial aneurysm is: (PGI June 98)
 - Coarctation of aorta
 - Systemic hypertension
 - Hypotension
 - Intracranial hemorrhage
- Which is least common site of Berry aneurysm? (AIIMS Dec 95)
 - Basilar artery
 - Vertebral artery
 - Anterior cerebral artery
 - Posterior cerebral artery

CEREBROVASCULAR STROKE (CVA)

- All are predisposing causes of cerebral venous thrombosis except: (ComedK 2005)
 - Hypotension
 - Oral contraceptives
 - Pregnancy
 - Aplastic anemia
- The most common site of hypertensive intracranial hemorrhage is: (ComedK 2010)
 - Putamen
 - Midbrain
 - Medulla
 - Cerebrum
- Most common cause of cerebrovascular accident is: (AIIMS 96, All India 98)
 - Embolism
 - Arterial thrombosis
 - Venous thrombosis
 - Hemorrhage
- Most common cause of stroke young women in India among OCP users: (PGI Dec 98)
 - Cortical vein thrombosis
 - Moyamoya disease
 - Atherosclerosis
 - HT
- Most common cause of intracranial hemorrhage is: (AIIMS Nov 98)
 - Subarachnoid hemorrhage
 - Intracerebral hemorrhage
 - Subdural hemorrhage
 - Extradural hemorrhage
- The commonest cause of intracerebral bleed is:
 - Thrombocytopenia
 - Diabetes
 - Hypertension
 - Berry aneurysm
- Which of the following is the most common location of hypertensive hemorrhage? (KERALA PG 2015; All Indian 2003, 94, AIIMS Nov 2002)
 - Pons
 - Thalamus
 - Putamen/external capsule
 - Subcortical white matter
- The most common location of hypertensive intracranial hemorrhage is: (AIIMS May 2007, All India 2006)
 - Subarachnoid
 - Basal ganglia
 - Cerebellum
 - Hippocampus
- Commonest cause of subarachnoid hemorrhage is:
 - Rupture of circle of Willis aneurysm
 - Rupture of vertebral artery aneurysm
 - Rupture of venocomitants of corpus striatum
 - Rupture of dural sinuses
- Which of the following is the most common cause of late neurological deterioration in case of cerebrovascular accident: (AIIMS Nov 2000)
 - Rebleeding
 - Vasospasm
 - Embolism
 - Hydrocephalus
- A patient known to have mitral stenosis and arterial fibrillation presents with acute onset of weakness in the left upper limb which recovered completely in two weeks. The most likely diagnosis is: (All India 2010)
 - Transient ischemic attack
 - Ischemic stroke
 - Hemorrhagic stroke
 - Vasculitis
- 'Duret hemorrhages' are seen in: (AIIMS May 2008)
 - Brain
 - Kidney
 - Heart
 - Lung

EDH AND SDH

18. Which of the following vessels is involved in extradural hematoma? (MHPGMCET 2002)

- a. Middle meningeal artery b. Venous sinuses
c. Bridging veins d. Middle cerebral artery

19. Lucid interval is classically seen in:

(DNB 2010, ComedK 2007, PGI Dec 97)

- a. Intracerebral hematoma
b. Acute subdural hematoma
c. Chronic subdural hematoma
d. Extradural hematoma

20. Middle meningeal vessel damage results in: (ComedK 2011)

- a. Subdural hemorrhage b. Subarachnoid hemorrhage
c. Intracerebral hemorrhage d. Epidural hemorrhage

21. Common site for extradural hemorrhage: (DNB 2012)

- a. Frontal b. Temporo-parietal
c. Occipital d. Brainstem

22. A 15 days duration SDH is? (MHSSMCET 2009)

- a. Hyperacute b. Acute
c. Subacute d. Chronic

23. For chronic SDH the duration should be more than:

(MHSSMCET 2010)

- a. 3 days b. 7 days
c. 15 days d. 1 months

24. Best treatment of subdural hematoma in a deteriorating patient: (HPU 2005)

- a. By I/V Mannitol b. Oxygenation
c. Use of steroids d. Surgical evacuation

25. Chronic subdural hematoma refers to collection present for a period of: (Karnataka 2006)

- a. 7 days b. 6 months
c. 1 year d. 21 days

26. Extradural hematoma is associated with what % of severe trauma? (PGI Dec 98)

- a. 36% b. 10%
c. 77% d. 96%

27. A person has been brought in casualty with history of road accident. He had lost consciousness transiently and gained consciousness but again became unconscious. Most likely, he is having brain hemorrhage of: (AIIMS Nov 2005)

- a. Intracerebral b. Subarachnoid
c. Subdural d. Extradural

28. Management of extradural hemorrhage is: (AIIMS 93)

- a. Antibiotics b. Immediate evacuation
c. Evacuation after 24 hours d. Observation

29. Features of extradural hemorrhage include in all except:

- a. Severe hypotension (AIIMS 82, APPG 87)
b. Deteriorating consciousness
c. Fixed dilated pupil on the same side
d. Fracture line crossing the temporal bone

30. An elderly man who has had a trivial history of head injury three months ago, develops headache and turns unconscious. On examination, he is found to have fixed left dilated pupil and right hemiplegia. What is the most likely diagnosis? (UPSC 96)

- a. Contusio-cerebri
b. Extradural hematoma
c. Chronic subdural hematoma
d. Brain abscess

31. Most common cause of sub-dural hematoma: (SCTIMS 98)

- a. Middle meningeal artery tear
b. Rupture of superior cerebral vein
c. Internal carotid artery tear
d. None of the above

32. A patient presents with sudden headache and vomiting and unconsciousness. The diagnosis is: (DPG 2009 Feb)

- a. Subarachnoid hemorrhage b. Intracerebral hemorrhage
c. Subdural hemorrhage d. Extradural hemorrhage

33. Lucid interval is seen in: (DPG 2005)

- a. Subdural hemorrhage b. Extradural hemorrhage
c. Parenchymal hemorrhage d. None of the above

34. A 20-years old male come to casualty with head injury, examination reveals normal consciousness, clinically normal and blood in the tympanic membrane. Most likely cause is:

(UPPG 2008)

- a. Extradural hemorrhage
b. Subdural hemorrhage
c. Intraventricular hemorrhage
d. Complete basilar fracture

35. Subdural hematoma most commonly results from:

- a. Rupture of intracranial aneurysm (AIIMS May 2004)
b. Rupture of cerebral AVM
c. Injury to cortical bridging veins
d. Hemophilia

36. Which of the following will manifest as "pachymeningitis haemorrhagica interna"? (MAHE 2006)

- a. Epidural hematoma b. Subdural hematoma
c. Subarachnoid hemorrhage d. Brain infraction

37. Immediate surgery is indicated in: (Kerala 95)

- a. Extradural hemorrhage b. Subdural hemorrhage
c. Intracerebral hemorrhage d. Brain laceration

38. A 62-years old diabetic female patient presented with history of progressive right-sided weakness of one month duration. The patient was also having speech difficulty. Fundus examination showed papilledema. Two months ago, she also had a fall in her bathroom and struck her head against a wall. The most likely clinical diagnosis is: (AIIMS Nov 2004)

- a. Alzheimer's disease
b. Left parietal glioma
c. Left MCA territory stroke
d. Left chronic subdural hematoma

39. An elderly female presented with history of progressive right-sided weakness and speech difficulty. She gives a history of a fall in her bathroom two months back. The most likely clinical diagnosis is: (All India 91)

- a. Progressive supranuclear palsy
b. Left cerebral tumor
c. Left sided stroke
d. Left chronic subdural hematoma

40. You are a surgeon posted at CHC. A patient of head injury comes to you with rapidly deteriorating sensorium and progressive dilatation and fixation of pupil. Neurosurgeon and CT scan is not available. You decide to make a burr hole to emergently relieve the intracranial pressure. Which of the following sites will you choose? (AIIMS November 2014)

- a. In the temporal region contralateral to the side of pupillary dilatation
b. In the midline if both pupils are equal or it is not known which side dilated first
c. In the left temporal region if no localizing sign is found
d. Refer to higher centre if both pupils are equal or it is not known which side dilated first

SUBARACHNOID AND INTRACRANIAL HEMORRHAGE

41. The common cause of subarachnoid hemorrhage is:
 - a. Arterio-venous malformation (All India 2006)
 - b. Cavernous angioma
 - c. Aneurysm
 - d. Hippocampus
42. Most common cause of subarachnoid hemorrhage is:

(Recent Question 2014, AIIMS Nov 98, All India 1999)

 - a. Hypertension
 - b. AV malformation
 - c. Berry aneurysm
 - d. Tumors
43. A female presented with severe headache of sudden onset. On CT scan a diagnosis of subarachnoid hemorrhage is made. The most common site of subarachnoid hemorrhage is:

(AIIMS June 2001)

 - a. Middle meningeal artery
 - b. Berry aneurysm rupture
 - c. Basilar artery
 - d. Subdural venous sinuses
44. Which of the following grading methods is used to evaluate the prognosis/outcome after subarachnoid hemorrhage?

(All India 2010)

 - a. Glasgow coma scale
 - b. Hess and Hunt scale
 - c. Glasgow - Blatchford bleeding score
 - d. Intracerebral hemorrhage score
45. A 45-years old hypertensive male presented with sudden onset most severe headache, vomiting and neck stiffness. On examination he didn't have any focal neurological deficit. His CT scan showed blood in the Sylvian fissure. The probable diagnosis is:

(AIIMS May 2003)

 - a. Meningitis
 - b. Ruptured aneurysm
 - c. Hypertensive bleed
 - d. Stroke
46. A 45-years old male patient presented in the casualty with two hours history of sudden onset of severe headache associated with nausea and vomiting, on clinical examination the patient had neck stiffness and right sided ptosis. Rest of the neurological examination was normal. What is the clinical diagnosis?

(AIIMS Nov 2003)

 - a. Hypertensive brain hemorrhage
 - b. Migraine
 - c. Aneurysmal subarachnoid hemorrhage
 - d. Arteriovenous malformation
47. An adult hypertensive male presented with sudden onset severe headache and vomiting. On examination, there is marked neck rigidity and no neurological deficit was found. The symptoms are most likely due to:

(AIIMS May 2013, AIIMS May 2012)

 - a. Intracranial parenchymal hemorrhage
 - b. Ischemic stroke
 - c. Meningitis
 - d. Subarachnoid hemorrhage
48. A young female presents with severe headache and neck stiffness of abrupt onset. She says, she has never had such severe headache before. She also complains of associated nausea and photophobia. Likely diagnosis is:

(AIIMS May 2009)

 - a. Subarachnoid hemorrhage (SAH)
 - b. Migraine
 - c. Viral encephalitis
 - d. Hydrocephalus
49. Sudden excruciating headache is most characteristic of:

(PGI Dec 2001)

 - a. SAH
 - b. Aneurysmal bleeding
 - c. Epilepsy
 - d. Intracerebral hemorrhage
 - e. Hysteria

50. A patient presented with thunder clap headache followed by unconsciousness and progressive III cranial nerve palsy. Which of the following is the most likely diagnosis:

(AIIMS Nov 2010)

 - a. Extradural hemorrhage
 - b. Aneurysmal subarachnoid hemorrhage
 - c. Basilar migraine
 - d. Cluster headache
51. A 25-years old male had severe headache followed by unconsciousness. CSF tap revealed red blood cells. Most likely diagnosis is:

(AIIMS Dec 94)

 - a. Subdural hematoma
 - b. Embolism
 - c. Tumour
 - d. Ruptured aneurysm

52. Triple H therapy for subarachnoid hemorrhage consists of all except:

(DNB 2014)

 - a. Hypertension
 - b. Hypervolaemia
 - c. Hemodilution
 - d. Hypothermia

HEAD INJURY

53. In a head injury patient, mannitol should not be used for control of increase intracranial pressure when:

(ComedK 2010)

 - a. Serum osmolality >320 mOsmol/kg
 - b. Arterial PaCO₂ <35 mm Hg
 - c. Arterial PaO₂ >100 mm Hg
 - d. Arterial pH 7.4
54. Cerebral edema is not caused by:

(Punjab 2011)

 - a. Lead toxicity
 - b. Craniosynostosis
 - c. Corticosteroids administration
 - d. Vitamin A intoxication
55. Not a primary brain injury:

(Punjab 2011)

 - a. Diffuse axonal injury
 - b. Contusion
 - c. Concussion
 - d. Intracerebral hematoma
56. Which among the following is not a primary brain injury?

(JIPMER 2010)

 - a. Cortical lacerations
 - b. Brainstem herniation
 - c. Diffuse axonal injury
 - d. Brainstem contusion
57. Duret hemorrhage is/are seen in:

(PGI May 2011, Nov 2010, Dec 2008)

 - a. Conjunctiva
 - b. Middle ear
 - c. Endothelium of heart
 - d. Brain
 - e. Lung
58. About cranial trauma false is:

(AIIMS Nov 2010)

 - a. Raccoon eyes seen in subgaleal hemorrhage
 - b. Depressed skull fracture is associated with brain injury at the immediate area of impact
 - c. Caroticocavernous fistula occur in base skull fracture
 - d. Post traumatic epilepsy seen in 15%
59. Which is an ominous sign in case of severe head injury?

(PGI Nov 2010)

 - a. Development of diabetes insipidus
 - b. Anisocoria
 - c. New focal deficit
 - d. Depressed skull fracture
 - e. Decorticate posturing
60. Battle's sign is present in:

(MHSSMCET 2006, 2005)

 - a. Anterior cranial fossa fracture
 - b. Middle cranial fossa fracture
 - c. Posterior cranial fossa fracture
 - d. Fracture lesser wing of sphenoid

61. In a vehicular accident, extensive contusions of brain due to acceleration and deceleration injury indicate what kind of injury? (MHSSMCET 2006)
 a. Penetrating injury b. Coup-Countercoup injury
 c. Second impact syndrome d. Crush injury
62. The most common neurologic abnormality that occurs with head injury is: (Karnataka 2005)
 a. Hemiplegia b. Ocular nerve palsy
 c. Altered consciousness d. Convulsion
63. Cushing reflex is: (UPPG 2007)
 a. ↑Mean arterial pressure with increased intracranial pressure
 b. ↑Mean arterial pressure with decreased intracranial pressure
 c. ↓Mean arterial pressure with increased intracranial pressure
 d. ↓Mean arterial pressure with decreased intracranial pressure
64. What is not found in head injury? (MCI March 2007)
 a. Confusion b. Loss of consciousness
 c. Lucid interval d. GCS score of 0
65. Raised intracranial pressure will cause: (MCI March 2007)
 a. Tachycardia
 b. Hypotension
 c. Papilloedema
 d. Normal looking anterior fontanelle in infants
66. True statement regarding fracture base of the skull are all of the following except:
 a. Prophylactic antibiotics are usually not required
 b. Associated with 8th cranial nerve palsy
 c. Early surgery is indicated for optimal outcome
 d. May present with CSF otorrhoea
67. The cause of systemic secondary insult to injured brain include all of the following except: (AIIMS May 2006)
 a. Hypercapnia b. Hypoxemia
 c. Hypotension d. Hypothermia
68. In a patient with head injury damage in the brain is aggravated by: (All India 2010)
 a. Hyperglycemia b. Hypothermia
 c. Hypocapnia d. Serum osmolality
69. Best prognostic factor for head injury is: (All India 2007)
 a. Glasgow coma scale b. Age
 c. Mode of injury d. CT
70. The earliest manifestations of increased intracranial pressure following head injury is: (All India 2005)
 a. Ipsilateral papillary dilatation
 b. Contralateral papillary dilatation
 c. Altered mental status
 d. Hemiparesis
71. Transtentorial uncal herniation causes all except: (AIIMS May 2001)
 a. Ipsilateral dilated pupils
 b. Ipsilateral hemiplegia
 c. Cheyne stokes respiration
 d. Decorticate rigidity
72. A patient present with unilateral painful ophthalmoplegia. Imaging revealed an enlargement of cavernous sinus on the affected side. The likely diagnosis is: (AIIMS May 2008)
 a. Gradenigo syndrome
 b. Cavernous sinus thrombosis
 c. Tolosa-Hunt Syndrome
 d. Orbital Pseudotumor
73. Non-noxious stimuli perceived as pain is termed as: (AIIMS May 2008)
 a. Allodynia b. Hyperalgesia
 c. Hyperesthesia d. Hyperpathia
74. Spontaneous CSF leaks may be associated with all except: (AIIMS Nov 2008)
 a. Increased Intracranial Tension
 b. Pseudotumor cerebri
 c. Empty Sella Syndrome
 d. Encephalocele
75. All of the following statements about Diffuse Axonal Injury (DAI) are true except: (All India 2008)
 a. Caused by shearing force
 b. Predominant white matter hemorrhages, in basal ganglion and corpus callosum
 c. Increased intracranial tension is seen in all cases
 d. Most common at junction of grey and white matter
76. Retraction ball is seen in: (Recent Question 2015).
 a. Burns b. Acute pancreatitis
 c. Diffuse axonal injury d. Tracheobronchial injury
77. Neurosurgery is indicated for all except: (Recent Questions 2013)
 a. SDH b. EDH
 c. Depressed fracture d. Diffuse axonal injury
78. A 24-years old man falls on the ground when he is struck in the right temple by a baseball. While being driven to the hospital, he lapses into coma. He is unresponsive with the dilated right pupil when he reaches the emergency department. The most important step in initial management is: (BIHAR PG 2014; All India 2002)
 a. Craniotomy
 b. CT scan of the head
 c. X-ray of the skull and cervical spine
 d. Doppler ultrasound examination of the neck
79. All of the following lower intracranial pressure except:
 a. Mannitol b. Furosemide (All India 98)
 c. Corticosteroids d. Hyperventilation
80. In skull fracture, the condition in which an operation is not done immediately is: (All India 96)
 a. Depressed fracture b. Compound fracture
 c. CSF leak d. Increased size of head
81. Surgery is not useful in: (JIPMER 81, DNB 89)
 a. Cerebral edema b. Depressed fracture
 c. Extradural hemorrhage d. Subdural hemorrhage
82. In a patient with head injury black eye associated with subconjunctival hemorrhage occurs when there is:
 a. Fracture of floor of anterior cranial fossa (UPSC 87)
 b. Bleeding between the skin and galea aponeurotica
 c. Hemorrhage between galea aponeurotica and pericranium
 d. Fracture of greater wing of sphenoid bone
83. Patient with a history of fall presents weeks later with headache and progressive neurological deterioration. The diagnosis is: (All India 89)
 a. Acute subdural hemorrhage
 b. Extradural hemorrhage
 c. Chronic subdural hemorrhage
 d. Fracture skull
84. The treatment of post traumatic epilepsy is: (AIIMS 84)
 a. Mannitol infusion b. Immediate corticosteroids
 c. Long term anticonvulsants d. Long term corticosteroids

85. Following are the features of raised intracranial tension except: (AIIMS 84)

- a. Altered sensorium b. Papilloedma
- c. Convulsions d. Tachycardia

86. Facial nerve palsy is seen in the following fracture: (AIIMS 84)

- a. Anterior cranial fossa b. Middle cranial fossa
- c. Cranial vault d. Posterior cranial fossa

87. The most important clinical finding in a case of head injury is: (JIPMER 91)

- a. Pupillary dilatation b. Level of consciousness
- c. Focal neurological deficit d. Fracture skull

88. Signs of cerebral compression are all except:

(UPSC 86, Kerala 87, JIPMER 88)

- a. Bradycardia b. Hypotension
- c. Papilloedma d. Vomiting

89. In patient of head injury with rapidly increasing intracranial tension without hematoma, the drug of choice for initial management would be: (UPSC 2000)

- a. Lasix b. Steroids
- c. 20% Mannitol d. Glycine

90. All of the following are indications of CT scan in head injured patient except: (DNB 2014)

- a. GCS < 13
- b. Vomiting 1 episode
- c. Focal neurological deficit
- d. Mild head injury in patient Age > 65 years

GLASGOW COMA SCALE

91. True about Glasgow coma scale: (JIPMER 2011)

- a. Includes verbal response
- b. Includes papillary reflex
- c. High score means poor prognosis
- d. Includes measurement of intracranial pressure

92. A patient with head injury opens eyes to painful stimulus, uses inappropriate words, and localizes pain, what is his GCS score? (MHCET 2016, All India 2011)

- a. 8 b. 10
- c. 12 d. 14

94. Minimal Glasgow coma scale is:

(Recent Question 2015, DNB 2012, UPPG 2010, MCI March 2007)

- a. 0 b. 1
- c. 2 d. 3
- e. 4

94. Mild head injury is having Glasgow coma scale of:

- a. 3-5 b. 5-8 (SGPGI 2005)
- c. 8-10 d. 13-15

95. Which of the following is not a component of Glasgow coma scale? (DNB 2009, All India 2006)

- a. Eye opening b. Motor response
- c. Pupil size d. Verbal response

96. Total score in Glasgow coma scale of a conscious person is:

- a. 8 b. 3 (All India 2006)
- c. 15 d. 10

97. Regarding Glasgow coma scale, which is not true?

- a. Ranges from 6-12 (AIIMS Nov 94)
- b. Low score indicates deteriorating brain function

- c. Based on eye opening, verbal response and motor response
- d. Score below 5 shows poor prognosis

98. All are true about Glasgow coma scale, except:

- a. Score between 3-15 (AIIMS June 94)
- b. Obeying motor command is given maximum score
- c. Consists of eye opening, motor and verbal response
- d. Increased score indicates poor prognosis

99. A person with inappropriate words evaluated by GCS will have a verbal score of: (All India 2012)

- a. 4 b. 3
- c. 2 d. 1

100. Prognostic factor in head injury: (Recent Questions 2013)

- a. Age of patient b. Glasgow coma scale
- c. Mode of injury d. Presence of facial trauma

101. What are the minimum and maximum possible values of Glasgow Coma Score? (AIIMS November 2015)

- a. Minimum = 3, Maximum = 15
- b. Minimum = 0, Maximum = 13
- c. Minimum = 0, Maximum = 15
- d. Minimum = 3, Maximum = 18

BRAIN ABSCESS

102. Management of epidural abscess is: (DNB 2011)

- a. Immediate surgical evaluation
- b. Conservative management
- c. Antibiotics
- d. Aggressive debridement

103. What are the minimum and maximum possible values of Glasgow Coma Score? (AIIMS November 2015)

- a. Minimum = 3, Maximum = 15
- b. Minimum = 0, Maximum = 13
- c. Minimum = 0, Maximum = 15
- d. Minimum = 3, Maximum = 18

104. Brain abscess in cyanotic heart disease is commonly located in: (All India 2006)

- a. Cerebellar hemisphere b. Thalamus
- c. Temporal lobe d. Parietal lobe

105. Brain abscess may be due to the following:

- a. Chronic suppurative otitis media (AIIMS 81, AMC 85)
- b. Chronic lung abscess
- c. Trauma
- d. Any of the above

106. Subdural collection of pus in a head injury patients after 3 days, the responsible organism is: (UPPG 2009)

- a. Staph aureus
- b. B hemolytic streptococcus
- c. H. influenza
- d. Pneumococcus

107. A young female patient with long history of sinusitis presented with frequent fever along with personality changes and headache of recent origin. The fundus examination revealed papilledema. The most likely diagnosis is:

- a. Frontal lobe abscess (AIIMS Nov 2004)
- b. Meningitis

- c. Encephalitis
- d. Frontal bone osteomyelitis

CNS CONGENITAL ANOMALIES

108. Meningomyelocele patient after being operated developed hydrocephalus due to: (PGI Dec 98)
- a. Arnold Chiari malformation
 - b. Injury to absorptive surface
 - c. Central canal injury
 - d. Arachnoidal block
109. Commonest site of meningocele is: (BIHAR PG 2014, DNB 2005, 2001, All India 89)
- a. Lumbosacral
 - b. Occipital
 - c. Frontal
 - d. Thoracic
110. Not true regarding Dandy-Walker cyst: (AIIMS June 98)
- a. Cerebellar vermis hypoplasia
 - b. Hydrocephalus
 - c. Arachnoid cyst
 - d. Posterior fossa cyst
111. What will be the diagnosis of the child with pulsatile swelling on medial side of the nose? (AIIMS June 98)
- a. Teratoma
 - b. Meningocele
 - c. Dermoid cyst
 - d. Carcinoma of ethmoid bone
112. A new born presents with swelling in base of the spine in which meninges herniates through bony defect cause is: (UPPG 2009)
- a. Defect in pedicle
 - b. Defect in body
 - c. Defect in fusion of vertebral arches
 - d. Defect in transverse process

113. A new born with meningomyelocele has been posted for surgery. The defect should be immediately covered with: (AIIMS May 2013, All India 2012)
- a. Normal saline gauze
 - b. Povidone iodine gauze
 - c. Tincture benzoin gauze
 - d. Methylene blue gauze

HYDROCEPHALUS

114. In normal pressure hydrocephalus, all are seen except: (PGI Dec 97)
- a. Convulsion
 - b. Ataxia
 - c. Dementia
 - d. Incontinence
115. Most commonly performed shunt for hydrocephalus is: (AIIMS May 2015)
- a. Ventriculoperitoneal
 - b. Ventriculopericardial
 - c. Ventriculopleural
 - d. Lumboperitoneal

NERVE COMPRESSION SYNDROME

116. Carpal tunnel syndrome is due to the compression of: (JIPMER 2011, ComedK 2006)
- a. Median nerve
 - b. Anterior interosseous nerve
 - c. Radial nerve
 - d. Ulnar nerve

117. Carpal tunnel syndrome is caused by all except:

(AIIMS May 2011)

- a. Amyloidosis
- b. Hypothyroidism
- c. Addison's disease
- d. Diabetes mellitus

118. In causalgia, the nerve most commonly affected are:

(AIIMS 86, 88)

- a. Radial and ulnar
- b. Median and sciatic
- c. Radial and peroneal
- d. Ilioinguinal and sural

119. Commonest cause of carpal tunnel syndrome is:

(All India 95)

- a. Malunited Colle's fracture
- b. Rheumatoid arthritis involving flexor retinaculum
- c. Myxedema
- d. Pregnancy

120. All produce carpal tunnel syndrome except:

(Kerala 98)

- a. Colle's fracture
- b. Acromegaly
- c. Addison's disease
- d. Hypothyroidism

NERVE INJURIES

121. Tinel's sign indicates:

(Kerala 91)

- a. Atrophy of nerves
- b. Neuroma
- c. Injury to nerve
- d. Regeneration of nerves

122. Bilateral phrenic nerve palsy is caused by:

(PGI 80, DPG 79, 93)

- a. Carcinoma bronchus
- b. Polio
- c. Medullary carcinoma thyroid
- d. Paget's disease

123. After an open injury, the optimum time for nerve suture is:

(AIIMS 78, 79, PGI 85)

- a. Immediately
- b. Within one month
- c. 1-2 month
- d. 2-4 month
- e. When wound is free from infection

124. In Erb-Duchene paralysis, the injury is limited to the:

(Comed-K 2008)

- a. 2nd and 3rd cervical nerves
- b. 3rd and 4th cervical nerves
- c. 4th and 5th cervical nerves
- d. 5th and 6th cervical nerves

125. Peripheral nerves can withstand ischemia upto:

(JIPMER 93)

- a. 30 minutes
- b. 1 hour
- c. 2 hours
- d. 4 hours

MISCELLANEOUS

126. Which of the following is the most common location of intracranial neurocysticercosis? (AIIMS Nov 2005)

- a. Brain parenchyma
- b. Subarachnoid space
- c. Spinal cord
- d. Orbit

127. The nerve of Kuntz is an important landmark in:

(PGI 79, DPG 84)

- a. Lumbar sympathectomy
- b. Cervicodorsal sympathectomy
- c. Obturator neurectomy
- d. Splanchnicectomy
- e. Herniorrhaphy

128. A dome shaped skull with a high forehead in the infant with slight hydrocephalus (Olympian brow) is seen in:

(JIPMER 81, AMU 88)

- a. Marasmus
- b. Congenital syphilis
- c. Rickets
- d. Arnold Chiari syndrome

129. The parasitic infection capable of producing spinal cord compression is /are: (AIIMS 81, DPG 83)
- Leishmaniasis
 - Wuchereriasis
 - Echinococcosis
 - Amoebiasis
130. The following are CNS findings of CO₂ narcosis: (PGI 90)
- Excitement
 - Increased pH of CSF
 - Decreased pH of CSF
 - Papilledema
131. All of the following conditions are known to cause diabetes insipidus except: (AIIMS 2004)
- Multiple sclerosis
 - Head injury
 - Histiocytosis
 - Viral encephalitis
132. Cells from the neural crest are involved in all except: (AIIMS June 2003)
- Hirschprung's disease
 - Neuroblastoma
 - Primitive neuroectodermal tumour
 - Wilm's tumour
133. All can commonly occur in a patient who suffered decelerating injury in which pituitary stalk was damaged, except one: (AIIMS Nov 2000)
- Diabetes mellitus
 - Thyroid insufficiency
 - Adrenocortical insufficiency
 - Diabetes insipidus
134. The defective migration of neural crest cells results in: (PGI June 2006)
- Congenital megacolon
 - Albinism
 - Adrenogenital hypoplasia
 - Dentinogenesis imperfect
135. Hemostasis in scalp wound is best achieved by: (DPG 2011)
- Direct pressure over the wound
 - Catching and crushing the bleeders by hemostasis
 - Eversion of galea aponeurotica
 - Coagulation of bleeders
136. Premature filling of veins is a manifestation in cerebral angiography of: (AIIMS 78, AMU 85)
- Trauma
 - Brain tumour
 - Arteriovenous malformation
 - Arterial occlusion
137. Neurosurgical treatment of epilepsy usually involves, removal of epileptic focus from which lobe: (Karnataka 2003)
- Frontal lobe
 - Temporal lobe
 - Occipital lobe
 - Parietal lobe
138. Blow out fracture refers to: (JIPMER 2011)
- Fracture of orbit
 - Fracture of nasal septum
 - Fracture base of skull
 - Fracture of mandible
139. The 'Phenomenon of Kernohan's notch' is associated with: (MHSSMCET 2006)
- Third nerve palsy with contralateral hemiplegia
 - Subfalacine herniation
 - Transtentorial herniation
 - Foramen magnum fracture
140. Signs of base of skull fracture are following except: (MHSSMCET 2011)
- Raccoon eyes
 - Battle's sign
 - Constricted pupil
 - aemotympanum
141. A newborn present with congestive heart failure. On examination has bulging anterior fontenalle with a bruit on auscultation. Trans-fontenallar USG shows a hypoechoic midline mass with dilated lateral ventricles. Most likely diagnosis: (AIIMS Nov 2011, May 2010, Nov 2006)
- Medullloblastoma
 - Encephalocele
 - Vein of Galen malformation
 - Arachnoid cyst

EXPLANATIONS

BERRY ANEURYSM

1. Ans. a. Junction of anterior communicating artery with anterior cerebral artery (Ref: Harrison 18/e p2262-2264; Sabiston 19/e p1879-1883; Schwartz 9/e p1534; Bailey 26/e p311, 25/e p635-637).

BERRY ANEURYSM

- Berry aneurysms: MC intracranial aneurysm^Q, saccular in appearance, arising at the bifurcation of intracranial arteries.
- About 85% aneurysms occur in the anterior circulation, on the circle of willis^Q.

Occurrence of Berry aneurysm in order of frequency

Anterior communicating artery- Anterior Cerebral junction (29%)^Q

Posterior communicating artery-Internal carotid junction (28%)

Middle cerebral bifurcation (18%)

Intracranial carotid bifurcation (8%)

Vertebrobasilar or basilar bifurcation (3%)

2. Ans. b. Vertebral artery. 3. Ans. c. Wall contains smooth muscle fibroblasts (Ref: Harrison 18/e p2262-2264)

BERRY ANEURYSM (SACCULAR OR CONGENITAL ANEURYSM)

- MC type of intra-cranial aneurysm^Q; Multiple in 20-30% cases
- Predisposing factors: Smoking and hypertension^Q
- Wall of Berry aneurysm is made up of thickened hyalinized intima^Q. The adventitia covering the sac is continuous with that of parent artery.

Increased Risk of Berry Aneurysm in

ADPKD^Q

Ehlers-Danlos syndrome

NF-1^Q

Marfan's syndrome

Fibromuscular dysplasia

Coarctation of aorta

- Rupture of aneurysm usually occurs at the apex^Q (dome) resulting in subarachnoid hemorrhage^Q or intraparenchymal hemorrhage or both^Q.
- Unruptured aneurysms are usually completely asymptomatic^Q.

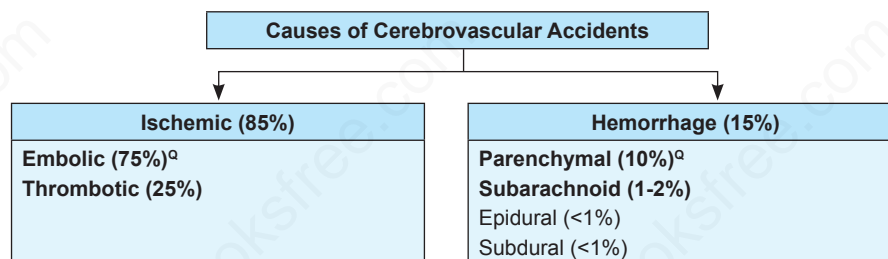
4. Ans. d. Intracranial hemorrhage
5. Ans. b. Vertebral artery

CEREBROVASCULAR STROKE (CVA)

6. Ans d. Aplastic anemia
7. Ans. a. Putamen (Ref: Harrison 18/e p2262-2264)

Intracerebral (Parenchymal) Hemorrhage	Subarachnoid Hemorrhage
MC type of intracranial hemorrhage^Q MC cause is hypertension^Q , causing rupture of small perforating arteries or arterioles ^Q MC site: Basal ganglia (Putamen^Q)	2nd MC cause of intracranial hemorrhage^Q MC cause: Trauma > Spontaneous rupture of Berry aneurysm^Q MC site of Berry aneurysm is anterior circulation of "circle of willis"^Q

8. Ans. a. Embolism (Ref: Harrison 18/e p3271, 3274)



9. Ans. a. Cortical vein thrombosis (Ref: Harrison 18/e p3278)

- Young women on OCPs are predisposed to stroke due to venous thrombosis of lateral sagittal sinus or small cortical veins (cortical vein thrombosis)^Q.

10. Ans. b. Intracerebral hemorrhage

11. Ans. c. Hypertension

12. Ans. c. Putamen/external capsule

13. Ans. b. Basal ganglia

14. Ans. a. Rupture of circle of Willis aneurysm

15. Ans. b. Vasospasm (Ref: Harrison 18/e p2263)

VASOSPASM

- Narrowing of the arteries at the base of the brain following SAH occurs regularly.
- This vasospasm causes symptomatic ischemia and infarction in approximately 30% patients and is the major cause of delayed morbidity or death^Q.
- Sign of ischemia appear 4-14 days after the hemorrhage, most frequently at about 7 days^Q.

Major causes of Delayed Neurological deficit after CVA

Re-rupture ^Q Hydrocephalus ^Q	Vasospasm ^Q Hyponatremia ^Q
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16. Ans. b. Ischemic stroke

17. Ans. a. Brain (Ref: Robbins 8/e p1283-1284)

DURET HEMORRHAGE

- In case of increased ICP down ward herniation of brainstem occur, which cause stretching of perforators of basilar artery and may results in bleed (Duret hemorrhage)^Q.
- Duret hemorrhage is small area of bleeding in ventral and paramedian part of upper brainstem (midbrain and pons)^Q.
- It usually indicates a fatal outcome, however survival has been reported.
- Diagnosis is made on CT or MRI.

EDH AND SDH

18. Ans. a. Middle meningeal artery (Ref: Harrison 18/e p3379-3380; Sabiston 19/e p439-441; Schwartz 10/e p174,1719-1720, 9/e p1525; Bailey 26/e p315-316, 25/e p303-304)

Extradural Hematoma	Subdural Hematoma (Acute)
<ul style="list-style-type: none"> • EDH is a neurosurgical emergency^Q. • Nearly always associated with a skull fracture^Q. • More common in young male patients^Q. • Associated with tearing of a meningeal artery^Q. • Hematoma accumulates in the space between bone and dura. • MC site: Temporal^Q (pterion is thinnest part of skull and overlies middle meningeal artery) • Not always arterial: disruption of a major dural venous sinus can result in an EDH. • Force required to sustain a skull fracture can be surprisingly small^Q – a fall from standing or a single blow to the head. • Classical presentation: Initial injury followed by a lucid interval^Q (occurring in <1/3rd of cases) • Early recognition and treatment is likely to result in full recovery • Delays in diagnosis and treatment can result in death from secondary brain injury. • EDH on CT scan: Lentiform (lens shaped or biconvex^Q) hyperdense lesion between the skull and brain. • Treatment of EDH: Immediate surgical evacuation^Q via a craniotomy. • Overall mortality for all cases of EDH is about 18% but for isolated EDH it is about 2%. 	<ul style="list-style-type: none"> • SDH accumulates in the space between dura and arachnoid^Q. • Disruption of a cortical vessel or brain laceration^Q • Nearly always associated with a significant primary brain injury^Q. • Patients present with an impaired conscious level from the time of injury, but further deterioration can occur as the hematoma expands. • CT appearance of SDH: Hyperdense (acute blood) concave appearance^Q. • Treatment of SDH: Evacuation via craniotomy. • Small hematomas with little mass effect may be managed conservatively in neurosurgical centers. • Mortality rate from SDH is much higher than for EDH and is as high as 40% in some series^Q.

19. Ans. d. Extradural hematoma

20. Ans. d. Epidural hemorrhage

21. Ans. b. Temporo-parietal

22. Ans. c. Subacute (Ref: Bailey 24/e p598-599; Schwartz 10/e p1719-1720, 9/e p1525-1526)

CLASSIFICATION OF SDH

- Acute SDH: <3 days^Q
- Subacute SDH: 4-21 days^Q
- Chronic SDH: >21 days^Q

23. Ans. c. 15 days

24. Ans. d. Surgical evacuation

25. Ans. d. 21 days (Ref: Harrison 18/e p3379-3380; Sabiston 19/e p439-441; Schwartz 10/e p1719-1720, 9/e p1525; Bailey 26/e p316, 25/e p305)

CHRONIC SUBDURAL HEMATOMA

- Chronic SDH: Collection of blood breakdown products that is **at least 2-3 weeks old**^Q.
- Chronic SDHs often occur in patients without a clear history of head trauma, as they may arise from minor trauma^Q.

Clinical Features

- Alcoholics, the elderly, and patients on anticoagulation are at **higher risk** for developing chronic SDH^Q.
- Patients may present with **headache, seizure, confusion, contralateral hemiparesis, or coma**^Q.

Treatment

- A chronic SDH >1 cm or any symptomatic SDH should be surgically drained.
- **Chronic SDH** typically consists of a **viscous fluid**, with a texture and **dark brown color** reminiscent of **motor oil**.
- A simple **burr hole** can effectively **drain most chronic SDHs**.

- The procedure is **converted to open craniotomy** if the SDH is **too congealed for irrigation drainage**, the complex of membranes **prevents effective drainage**, or **persistent hemorrhage** occurs that cannot be reached with bipolar cautery through the burr hole^Q.

- **Follow-up head CT scans:** Approximately **1 month later** to document resolution.

26. Ans. b. 10% (Ref: Harrison 18/e p3379)

- Harrison says "Epidural hematomas occur in **upto 10% of severe head injury** cases and are **less often associated with underlying cortical damage than subdural hematomas**."^Q

27. Ans. d. Extradural

28. Ans. b. Immediate evacuation

29. Ans. a. Severe hypotension

30. Ans. c. Chronic subdural hematoma

31. Ans. b. Rupture of superior cerebral vein

32. Ans. a. Subarachnoid hemorrhage (Ref: Harrison 18/e p2262-2263; Sabiston 19/e p1880-1882; Schwartz 10/e p1730-1731, 9/e p1534-1536; Bailey 26/e p317, 25/e p30)

SUBARACHNOID HEMORRHAGE

- **MC cause:** Trauma > Spontaneous rupture of **Berry aneurysm**^Q

Clinical Features

- **Sudden transient loss of consciousness**^Q (occurs in nearly half of the patients)
- **Excruciating severe headache**^Q: presenting complaint in 45% of cases (worst headache of patients life) more common upon regaining consciousness when loss of consciousness is associated

- **Neck stiffness and vomiting**^Q: are common associations
- **Focal neurological deficit: uncommon.**
- **Sudden headache in the absence of focal neurological deficit is the hallmark of aneurysmal rupture.**^Q

- Associated prodromal symptoms (suggest **location** of progressively enlarging unruptured aneurysm):

- **Third cranial nerve palsy**^Q: Aneurysm at junction of **PCA and ICA**
- **Sixth nerve palsy**^Q: Aneurysm in **cavernous sinus**
- Occipital and posterior cervical pain: **Inferior cerebellar artery aneurysm**
- Pain in or behind the eye^Q: **MCA aneurysm**

Diagnosis

- **Non contrast CT scan:** Investigation of choice (Lumbar puncture is not indicated prior to an imaging procedure)
- **CSF picture:** Hallmark of aneurysmal rupture is **blood in CSF (Xanthochromic spinal fluid)**^Q

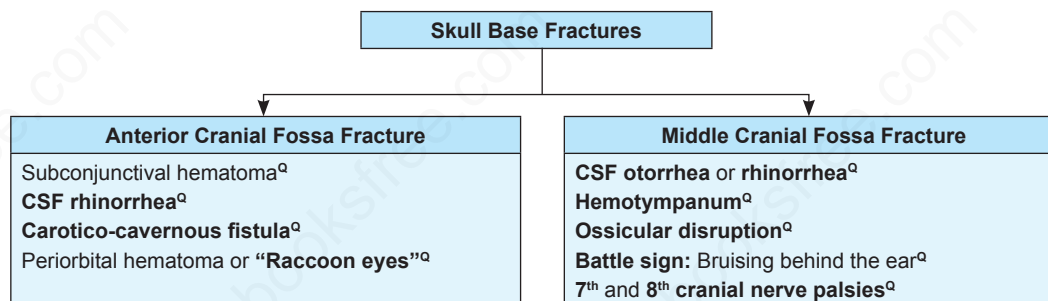
- Lumbar puncture should be performed if the CT scan fails to establish the diagnosis of SAH and no mass lesion or obstructive hydrocephalus is found to establish the presence of subarachnoid blood^Q

Treatment

- Traumatic subarachnoid hemorrhage is managed conservatively^Q.

33. Ans. b. Extradural hemorrhage

34. Ans. d. Complete basilar fracture (Ref: Bailey 26/e p314, 25/e p302; 24/e p595-599)



35. Ans. c. Injury to cortical bridging veins

36. Ans. b. Subdural hematoma (Ref: www.ncbi.nlm.nih.gov/pubmed/11915757 by M Guénou - 2001)**CHRONIC SUBDURAL HEMATOMA**

- Virchow, in 1857, denied a traumatic origin, and gave the name of "pachymeningitis hemorrhagica interna"^Q to this pathology which he explained by inflammatory processes.
- The traumatic etiology of chronic subdural hematoma was recognized in the 20th century, especially by Trotter in 1914.

37. Ans. a. Extradural hemorrhage

38. Ans. d. Left chronic subdural hematoma

39. Ans. d. Left chronic subdural hematoma

40. Ans. c. In the left temporal region if no localizing sign is found (Ref: Ramamurthi and PN Tandon's Textbook of Neurosurgery 3/e Vol-1/ p442)

Burr hole to emergently relieve the intracranial pressure should be done in the left temporal region if no localizing sign is found, to evaluate and decompress the dominant hemisphere.

CHOICE OF SIDE FOR INITIAL BURR HOLE**Start with a temporal burr hole on the side:**

- Ipsilateral to a blown pupil: This will be on the correct side in >85% of epidural hemorrhages and other extra-axial mass lesions.
- If both pupils are dilated, use the side of the first dilating pupil (If known).
- If pupils are equal, or it is not known which side dilated first, place on side of obvious external trauma.
- If no localization clues, place hole on left side (to evaluate and decompress the dominant hemisphere).

SUBARACHNOID AND INTRACRANIAL HEMORRHAGE

41. Ans. c. Aneurysm

42. Ans. c. Berry aneurysm

43. Ans. b. Berry aneurysm rupture

44. Ans. b. Hess and Hunt scale (Ref: Harrison 18/e p2262)

- Hess and Hunt Scale: Most widely used scale to grade the severity of subarachnoid hemorrhage, predict the prognosis / outcome of hemorrhage and thereby plan further intervention^Q.

Grading Scale for Subarachnoid Hemorrhage	
Grade	Hunt – Hess Scale
1	Mild headache, normal mental status, no cranial nerve or motor findings
2	Severe headache, normal mental status, may have cranial nerve deficit
3	Somnolent, confused, may have cranial nerve or mild motor deficit
4	Stupor, moderate to severe motor deficit, may have intermittent reflex posturing
5	Coma, reflex posturing or flaccid
Good grade: Grade 1, 2 and 3; Poor grade: Grade 4 and 5	

45. Ans. b. Ruptured aneurysm
 46. Ans. c. Aneurysmal subarachnoid hemorrhage
 47. Ans. d. Subarachnoid hemorrhage
 48. Ans. a. Subarachnoid hemorrhage (SAH)
 49. Ans. a. SAH, b. Aneurysmal bleeding
 50. Ans. b. Aneurysmal subarachnoid hemorrhage
 51. Ans. d. Ruptured aneurysm
 52. Ans. d. Hypothermia (Ref: *Comprehensive Board Review in Neurology* by Mark K. Borsody (Thieme) p63)

TRIPLE H THERAPY

- Triple H therapy of subarachnoid hemorrhage used to ameliorate cerebral perfusion, consists of:
 1. Hypervolemia
 2. Hypertension
 3. Haemodilution

HEAD INJURY

53. Ans. a. Serum osmolality >320 mOsm/kg (Ref: *Harrison 18/e* p2257; *Schwartz 10/e* p195-197, 575-578, 1715-1721, 9/e p1521; *Bailey 26/e* p318, 25/e p306; *KDT 6/e* p572)

MANNITOL

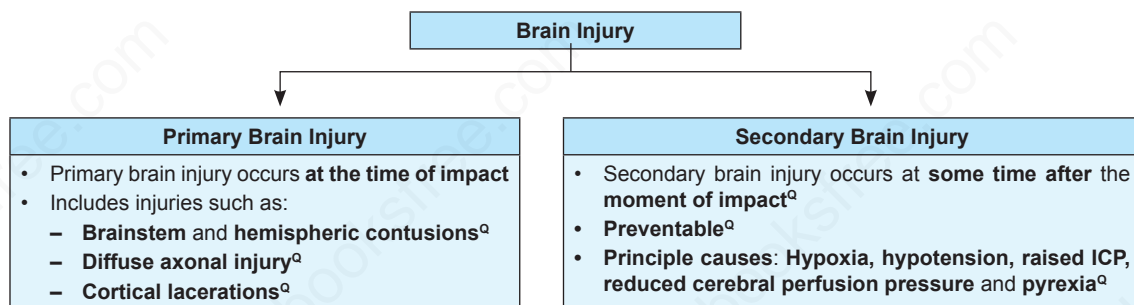
- Mannitol is widely used to **reduce ICP**^Q
- Commonly used preparation: 20% solution, 0.25-1 gm/kg is given IV as bolus^Q
- Serum osmolality should not be allowed to go >320 mOsm/L, to avoid systemic acidosis and renal failure^Q.

Uses of Mannitol

- Increased ICT or intraocular tension^Q
- To maintain GFR and urine flow in impending renal failure^Q
- Forced diuresis in hypnotic or other poisoning^Q
- To counteract low osmolality of plasma/ECF^Q due to rapid hemodialysis or peritoneal dialysis

Contraindication of Mannitol	
Acute tubular necrosis ^Q	Acute left ventricular failure ^Q
Anuria ^Q	CHF ^Q
pulmonary edema ^Q	Cerebral hemorrhage ^Q

54. Ans. c. Corticosteroids administration
 Steroids are used in treatment of cerebral edema
 55. Ans. d. Intracerebral hematoma (Ref: *Bailey 26/e* p314, 25/e p299-300)



56. Ans. b. Brainstem herniation
 57. Ans. d. Brain
 58. Ans. a. Raccoon eyes seen in subgaleal hemorrhage (Ref: *Schwartz 9/e* p148)

- Otorrhea, rhinorrhea, raccoon eyes and Battle's sign suggest a basilar skull fracture^Q.

59. Ans. b. Anisocoria, e. Decorticate posturing (Ref: *Harrison 18/e* p2249-2251)

HEAD INJURY

- A sudden enlargement (dilation) of one pupil (anisocoria) is an ominous sign^Q.
- Abnormal posturing (decorticate posturing) a characteristic positioning of the limbs caused by severe diffuse injury or high ICP, is an ominous sign^Q.

60. Ans. b. Middle cranial fossa fracture

61. Ans. b. Coup-Countercoup injury (Ref: Bailey 26/e p317, 25/e p305)

CEREBRAL CONTUSIONS

- Cerebral contusions result from the brain being damaged by:
 - Impacting against the skull either at the point of impact (the 'coup') or on the other side of the head ('contre-coup')^Q
 - As the brain slides forwards and backwards over the ridged cranial fossa floor (most often affecting the inferior frontal lobes and temporal poles)^Q

Diagnosis

- CT scan: Heterogeneous with mixed areas of high and low density^Q.
There may be an associated mass effect. Contusion appears uniformly hyperdense.

Treatment

- Cerebral contusions rarely require immediate surgical treatment.
 - Patient with cerebral contusions must be admitted for observation as these lesions will tend to mature and expand for 48–72 hours following injury^Q.
- Small proportion of cerebral contusions will require delayed surgical evacuation to reduce the mass effect^Q.

62. Ans. c. Altered consciousness

63. Ans. a. ↑Mean arterial pressure with increased intracranial pressure (Ref: Schwartz 10/e p1580–1583, 9/e p1521; Bailey 25/e p483)

CUSHING REFLEX

- The Cushing reflex classically presents as an increase in systolic blood pressure, reduction of the heart rate (bradycardia), and irregular respiration^Q.
- It is caused by increased intracranial pressure^Q.
- These symptoms can be indicative of insufficient blood flow to the brain (ischemia) as well as compression of arterioles^Q.

64. Ans. d. GCS score of 0

65. Ans. c. Papilloedema

66. Ans. c. Early surgery is indicated for optimal outcome (Ref: Bailey 26/e p314, 25/e p308)

BASE OF SKULL FRACTURES

- Base of skull fractures may be associated with 7th or 8th nerve palsies^Q.
- CSF otorrhoea or rhinorrhoea often resolves spontaneously^Q.
- Antibiotics are not required prophylactically unless for concomitant facial fractures^Q.
- A delayed craniotomy^Q and anterior fossa dural repair is occasionally required^Q for persistent CSF leak to prevent meningitis.

67. Ans. d. Hypothermia (Ref: Bailey 25/e p299–300; Harrison 18/e p2257)

Causes of Secondary Brain Injury

Hypoxia ^Q : PO ₂ <8 kPa	Hypercapnia ^Q
Hypotension ^Q : SBP < 90 mm Hg	Pyrexia (hyperthermia) ^Q
Raised ICP ^Q : ICP >20 mm Hg	Seizures ^Q
Low cerebral perfusion pressure ^Q : CPP <65 mm Hg	Metabolic disturbance (Hyperglycemia ^Q)

68. Ans. a. Hyperglycemia (Ref: Harrison 18/e p2257)

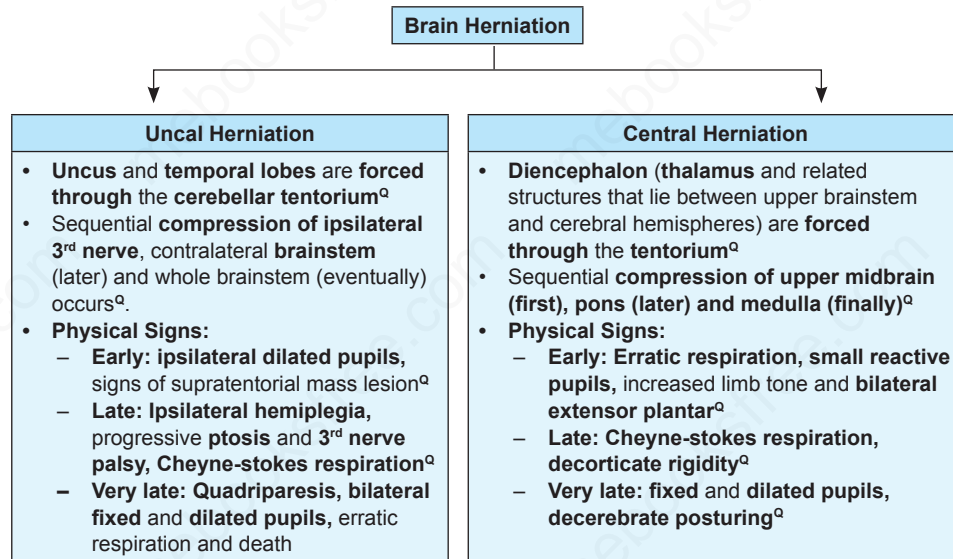
- Hyperglycemia is associated with a poor outcome after traumatic brain injury and has been shown to be associated with increased mortality^Q.
- Hyperglycemia injures the microvasculature and worsens ischemia^Q.

69. Ans. a. Glasgow coma scale

70. Ans. c. Altered mental status

71. Ans. d. Decorticate rigidity (Ref: Harrison 18/e p2248; Sabiston 19/e p1874–1875; Schwartz 10/e p1713, 9/e p1521; Bailey 26/e p312, 25/e p300)

Decorticate rigidity is seen in central herniation, not in uncal herniation.



72. Ans. c. Tolosa-Hunt Syndrome (Ref: Harrison 18/e p1662-1663)

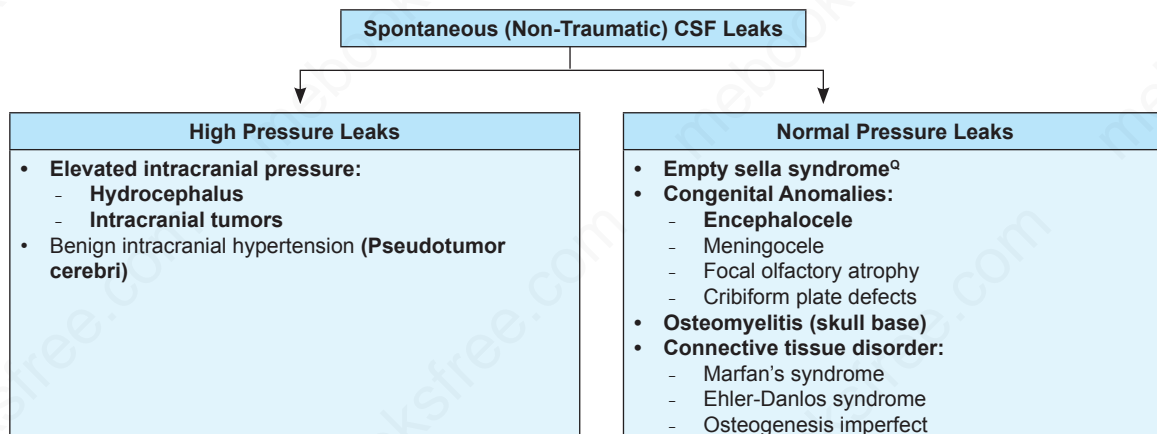
TOLOSA-HUNT SYNDROME/ORBITAL APEX SYNDROME

- One of the lesion of orbital apex^Q
 - Characterized by **painful, acute ophthalmoplegia**, with or without involvement of the optic nerve and ophthalmic division (V₁) of trigeminal nerve^Q
 - Responds promptly to steroid treatment^Q
- Tolosa described a case in which a **mass of granulation material** was found around the carotid artery in the cavernous sinus and asymmetrical enlargement of cavernous sinus, now referred as Tolosa-Hunt syndrome^Q.

73. Ans. a. Allodynia (Ref: Harrison 18/e p96, 186)

Terminology	Sensory Disturbance
Allodynia	<ul style="list-style-type: none"> • Situation in which a non-painful stimulus, once perceived, is experienced as painful, even excruciating^Q. • An example is elicitation of a painful sensation by application of a vibrating tuning fork.
Hyperalgesia	<ul style="list-style-type: none"> • Severe pain in response to a mildly noxious stimulus
Hyperpathia	<ul style="list-style-type: none"> • Threshold for a sensory stimulus is increased and perception is delayed, but once felt, it is unduly painful. • Broad term encompasses all the phenomena described by hyperesthesia, allodynia, and hyperalgesia.

74. Ans. none. (Ref: Diagnostic Nuclear Medicine 4/e p838)



75. Ans. c. Increased intracranial tension is seen in all cases (Ref: Harrison 18/e p3378; Sabiston 19/e p1893)

DIFFUSE AXONAL INJURIES (DAI)

- DAI represents the presence of widespread axonal damage (white matter) in both hemispheres secondary to severe head injury^Q.
- Results from application of severe acceleration/deceleration or angular strain to the brain (injuries to axons by shearing force^Q)
- MC location: Lobar white matter at the junction of grey and white matter^Q > Corpus callosum > Brain stem

Pathology

- Hemorrhagic or non-hemorrhagic white matter tears in both hemispheres

Clinical Features

- Clinical presentation vary from concussion to coma
- Loss of consciousness is a common finding^Q
- DAI: MC cause of post-traumatic vegetative state^Q
- Raised ICT may or may not be associated^Q

Diagnosis

- MRI is IOC for DAI^Q (better than CT scan)

Prognosis

- DAI carries an extremely poor prognosis^Q.

76. Ans. c. Diffuse axonal injury

77. Ans. d. Diffuse axonal injury

78. Ans. a Craniotomy

79. Ans. b. Furosemide (Ref: Harrison 18/e p2257; Sabiston 19/e p1895)

STEPWISE APPROACH TO TREATMENT OF ELEVATED INTRACRANIAL PRESSURE

- Insert ICP monitor—ventriculostomy^Q versus parenchymal device
- General goals: maintain ICP <20 mmHg and CPP 60 mmHg^Q
- For ICP >20–25 mmHg for >5 min:
 - Drain CSF via ventriculostomy^Q (if in place)
 - Elevate head of the bed^Q; midline head position
 - Osmotherapy—mannitol^Q 25–100 g q4h as needed (maintain serum osmolality <320^Q mosmol) or hypertonic saline^Q (30 mL, 23.4% NaCl bolus)
 - Glucocorticoids—dexamethasone 4 mg q6h for vasogenic edema from tumor, abscess^Q (avoid glucocorticoids in head trauma, ischemic and hemorrhagic stroke^Q)
 - Sedation^Q (e.g., morphine, propofol, or midazolam); add neuromuscular paralysis if necessary (patient will require endotracheal intubation and mechanical ventilation at this point, if not before)
 - Hyperventilation^Q—to PaCO₂ 30–35 mmHg
 - Pressor therapy^Q—phenylephrine, dopamine, or norepinephrine to maintain adequate MAP to ensure CPP 60 mmHg (maintain euolemia to minimize deleterious systemic effects of pressors)
 - Consider second-tier therapies for refractory elevated ICP:
 - a. High-dose barbiturate therapy (“pentobarb coma”)^Q
 - b. Aggressive hyperventilation to PaCO₂ <30 mmHg^Q
 - c. Hypothermia^Q
 - d. Hemicraniectomy^Q

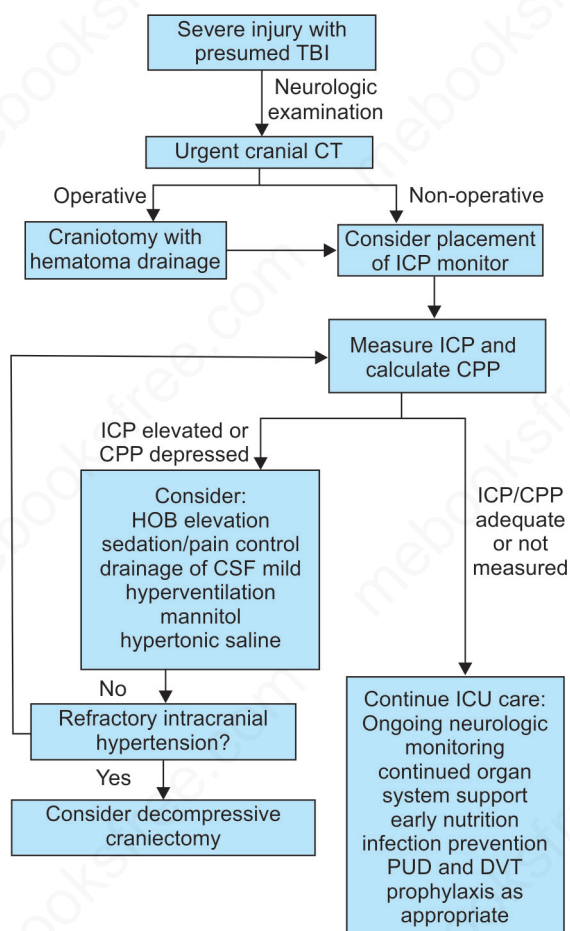


Fig. Traumatic brain injury (TBI)

80. Ans. c. CSF leak
 81. Ans. a. Cerebral edema
 82. Ans. a. Fracture of floor of anterior cranial fossa
 83. Ans. c. Chronic subdural hemorrhage
 84. Ans. c. Long-term anticonvulsants
 85. Ans. d. Tachycardia
 86. Ans. b. Middle cranial fossa
 87. Ans. b. Level of consciousness
 88. Ans. b. Hypotension
 89. Ans. c. 20% Mannitol
 90. Ans. b. Vomiting 1 episode (Ref: Bailey 25/e p278, 303)

NICE Guidelines for CT in Head Injury

- | | |
|-------------------------------|--|
| 1. GCS < 13 at any point | 4. Suspected open, depressed or basal skull fracture |
| 2. GCS 13 or 14 at 2 hours | 5. Seizures |
| 3. Focal neurological deficit | 6. Vomiting > one episode |

Urgent CT scan if none of the above but:

- | | |
|------------------------------------|--|
| 1. Age > 65 years | 3. Dangerous mechanism of injury (CT within 8 hours) |
| 2. Coagulopathy (e.g. on warfarin) | 4. Antegrade amnesia > 30 min (CT within 8 hours) |

GLASGOW COMA SCALE

91. Ans. a. Includes verbal response (Ref: Harrison 18/e p3381-3382; Sabiston 19/e p1894; Schwartz 10/e p168,1711, 9/e p1522; Bailey 26/e p312, 25/e p301-302)

Glasgow Coma Scale (GCS)					
Eye Opening		Verbal response		Best Motor response	
Spontaneous	4	Oriented	5	Obeys commands	6
To loud voice	3	Confused, disoriented	4	Localizes pain	5
To pain	2	Inappropriate words	3	Flexion (withdrawal) to pain	4
No response	1	Incomprehensible sounds	2	Abnormal flexion posturing	3
		No response	1	Extension posturing	2
				No response	1

- Maximum score-15, minimum score-3.
- Best predictor of outcome: Motor response^Q
- Patients scoring 3 or 4 have an 85% chance of dying or remaining vegetative, while scores above 11 indicate only a 5-10% likelihood of death.

92. Ans. b. 10 93. Ans. d. 3 94. Ans. d. 13-15 95. Ans. c. Pupil size 96. Ans. c. 15
 97. Ans. a. Ranges from 6-12 98. Ans. d. Increased score indicates poor prognosis 99. Ans. b. 3
 100. Ans. b. Glasgow coma scale
 101. Ans. a. Minimum = 3, Maximum = 15

BRAIN ABSCESS

102. Ans. a. Immediate surgical evacuation (Ref: Bailey 25/e p474)
 103. Ans. a. Minimum = 3, Maximum = 15
 104. Ans. d. Parietal lobe (Ref: Harrison 18/e p3428; Sabiston 19/e p1913; Schwartz 10/e p1745, 9/e p1550; Bailey 26/e p609-610, 25/e p628-629)

Brain abscess in congenital heart diseases occur due to hematogenous seeding of blood borne bacteria. These blood borne bacteria bypass the capillary bed due to right to left shunt. They commonly infect parietal and frontal lobes (territory of middle cerebral artery).

BRAIN ABSCESS

- Intracerebral abscess may occur as a result of **direct spread from air sinus infection**, following **surgery** or from **hematogenous spread** especially associated with **respiratory infection, endocarditis or dental infection**^Q.
- **Increased risk of abscess in: Cyanotic heart disease, immunocompromised** (diabetes, solid organ transplant, hematological malignancy or long-term steroids)^Q

Etiology	Location
Otitis media, mastoiditis	Temporal lobe ^Q > Cerebellum
Paranasal sinusitis, dental infections	Frontal lobes ^Q
Hematogenous	Parietal lobe ^Q

Clinical Features

- Presentation is with **focal signs, seizures** and **raised ICP**, as with other mass lesions, but the **time course is often short**^Q
- Patients may be febrile or have a raised peripheral white cell count or inflammatory markers.

Diagnosis

- CT scan: Ring-enhancing mass lesion (may be multiple in case of hematogenous spread)^Q

Treatment

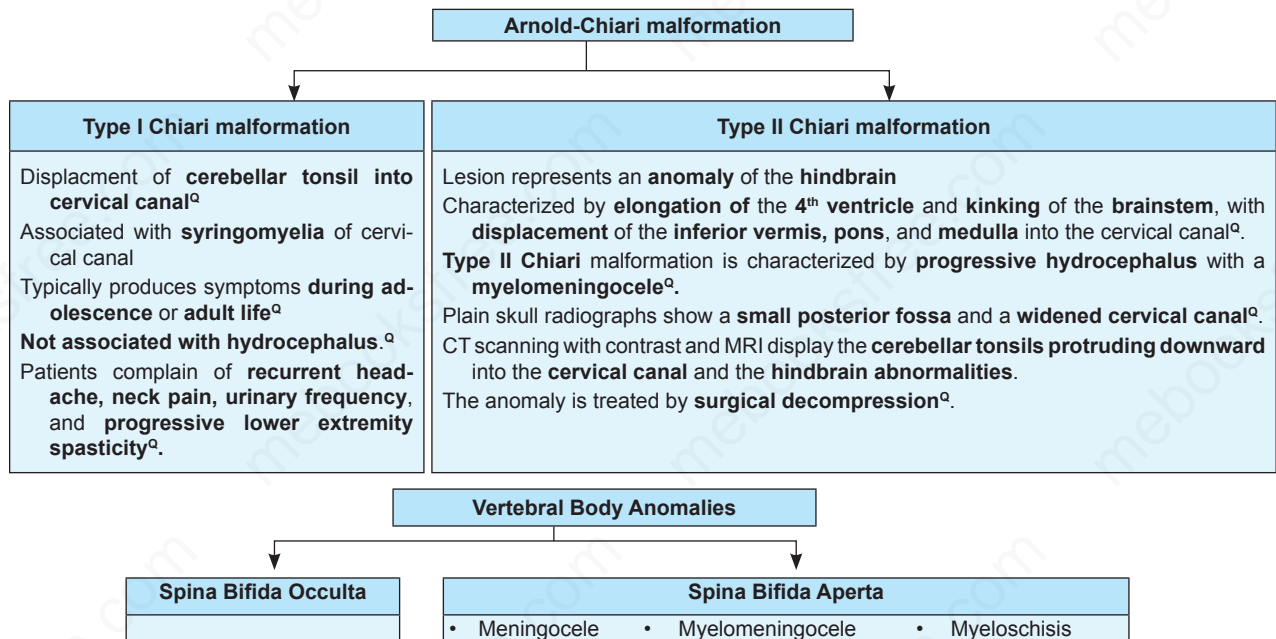
- **Surgical drainage + IV antibiotics** for at least 6 weeks^Q.
- **Multiple small abscesses** may be **treated medically** with antibiotics targeted against organisms
- **Steroids** are reserved for cases with **significant edema** or **mass effect**^Q
- Owing to the **high risk of seizures**, patients should also be **treated with anticonvulsants**.

105. Ans. d. Any of the above
 106. Ans. a. Staph aureus 107. Ans. a. Frontal lobe abscess

CNS CONGENITAL ANOMALIES

108. Ans. a. **Arnold Chiari malformation** (Ref: Sabiston 19/e p1911; Schwartz 10/e p1745, 9/e p1554; Bailey 26/e p484, 25/e p483)

Type II Chiari malformation is characterized by progressive hydrocephalus with a myelomeningocele.



109. Ans. a. **Lumbosacral** (Ref: Sabiston 19/e p1911; Schwartz 10/e p1750, 9/e p1553; Bailey 26/e p617, 25/e p483)

MENINGOCELE

- Herniation of meninges through a defect in the posterior vertebral arches^Q.
- Spinal cord is usually normal and assumes a normal position in the spinal canal
- There may be tethering, syringomyelia, or diastematomyelia.

Clinical Features

- A fluctuant midline mass, that may transilluminate occurs along the vertebral column, in the lower back^Q.
- Most meningoceles are well covered with skin and pose no threat to the patient.

- Anterior meningocele: Projects into pelvis through a defect in the sacrum^Q.
- Symptoms of constipation and bladder dysfunction develop due to the increasing size of the lesion^Q.

Diagnosis

- Plain roentgenograms demonstrate a defect^Q.

Treatment

- Asymptomatic children with normal neurologic findings and full-thickness skin covering the meningocele may have surgery delayed^Q.
- Patients with leaking CSF or a thin skin covering should undergo immediate surgical treatment to prevent meningitis^Q.

110. Ans. c. **Arachnoid cyst** (Ref: Sabiston 19/e p1911; Schwartz 9/e p1553)

DANDY-WALKER MALFORMATION

- Dandy-Walker malformation consists of a cystic expansion of the 4th ventricle in the posterior fossa and midline cerebellar hypoplasia^Q
- Results from a developmental failure of the roof of the 4th ventricle^Q during embryogenesis.

- Approximately 90% of patients have hydrocephalus^Q
- Other associated anomalies: Agenesis of the posterior cerebellar vermis and corpus callosum^Q.

Clinical features

- Infants present with a rapid increase in head size and prominent occiput^Q.
- Transillumination of the skull may be positive.
- Most children have evidence of long-tract signs, cerebellar ataxia, and delayed motor and cognitive milestones, probably due to the associated structural anomalies^Q.

Treatment

- Managed by shunting the cystic cavity^Q (and on occasion the ventricles as well) in the presence of hydrocephalus.

111. Ans. b. Meningocele
 112. Ans. c. Defect in fusion of vertebral arches
 113. Ans. a. Normal saline guaze (Ref: Sabiston 19/e p1910; Schwartz 10/e p1645, 9/e p1553; Bailey 26/e p611, 25/e p483, 641)

Meningomyelocele should be covered with a non-sticking sterile saline soaked guaze and plastic shield wrap to maintain moisture.

MYELOMENINGOCELE

- Most severe form of dysraphism involving the vertebral column
- Incidence: 1/4,000 live births^Q
- MC site of myelomeningocele: Lumbosacral region (75%)^Q

Etiology

- Genetic predisposition exists; the risk of recurrence after one affected child increases to 3-4% and increases to 10% with two previous abnormal pregnancies.

- Nutritional and environmental factors: Folate^Q is intricately involved in the prevention and etiology of NTDs.
- Maternal peri-conceptional use of folic acid supplementation reduces the incidence of neural tube defects in pregnancies at risk by at least 50%^Q.
- To be effective, folic acid supplementation should be initiated before conception and continued until at least the 12th week of gestation when neurulation is complete^Q.

Prevention

- All women of childbearing age and who are capable of becoming pregnant take 0.4 mg of folic acid daily.

Drugs increasing the risk of myelomeningocele	
Trimethoprim ^Q	Phenobarbital ^Q
Carbamazepine ^Q	Primidone ^Q
Phenytoin ^Q	Valproic acid ^Q

Clinical Features

- Produces dysfunction of skeleton, skin, gastrointestinal and genitourinary tracts, in addition to the peripheral nervous system and CNS^Q.
- Extent and degree of the neurologic deficit depend on the location of the myelomeningocele, as well as the associated lesions.

Location	Manifestation
Low sacral region	Bowel and bladder incontinence associated with anesthesia in the perineal area but with no impairment of motor function.
Midlumbar region	Flaccid paralysis of lower extremity, absence of deep tendon reflexes, lack of response to touch and pain
Thoracic region	Increasing neurologic deficit as the myelomeningocele extends higher into the thoracic region.
Upper thoracic and cervical region	Very minimal neurological deficit and no hydrocephalus

HYDROCEPHALUS

114. Ans. a. Convulsion (Ref: Harrison 18/e p3312-3313; Sabiston 19/e p1909)

NORMAL-PRESSURE HYDROCEPHALUS (NPH)

- Characterized by the clinical triad of:
 - Abnormal gait (ataxic or apractic)^Q
 - Dementia^Q (usually mild to moderate, with an emphasis on executive impairment)
 - Urinary urgency or incontinence^Q
- This syndrome is a communicating hydrocephalus^Q with a patent aqueduct of Sylvius

- NPH may be caused by obstruction to normal CSF flow over the cerebral convexities and delayed resorption into the venous system.
- The indolent nature of the process results in enlarged lateral ventricles with relatively little increase in CSF pressure^Q.

Diagnosis

- MRI: Enlarged lateral ventricles (hydrocephalus) with little or no cortical atrophy^Q
- Lumbar puncture opening pressure falls in the high normal range^Q
- CSF protein, glucose and cell counts are normal.

115. Ans. a. Ventriculoperitoneal (Ref: Bailey 26th/e p608; Nelson 19th/e p2008-2011)

Most common shunt used for hydrocephalus is ventriculoperitoneal shunt.

"Therapy for hydrocephalus depends on the cause. Medical management, including the use of acetazolamide and furosemide, can provide temporary relief by reducing the rate of CSF production, but long-term results have been disappointing. Most cases of hydrocephalus require extracranial shunts, particularly a ventriculoperitoneal shunt. Endoscopic third ventriculostomy (ETV) has evolved as a viable approach and criteria have been developed for its use, but the procedure might need to be repeated to be effective." - Nelson 19/e p2011

Management of Hydrocephalus			
<ul style="list-style-type: none"> • Acute hydrocephalus is an emergency since the condition can progress over minutes or hours to coma and death. • It may be relieved by addressing the underlying pathology, for instance by excision of a tumour responsible for an obstructive hydrocephalus. • Most often, however, temporary ventricular drainage is required, either as an emergency in an obtunded or deteriorating patient, or as a precaution during definitive surgery considering the possibility for postoperative swelling. 			
External ventricular drain: <ul style="list-style-type: none"> • EVDs are an effective temporary measure to relieve hydrocephalus. • Most commonly they are inserted freehand to the right of midline, anterior to the coronal suture, so that the catheter tip rests adjacent to the foramen of Monro in the lateral ventricle. • The catheter is then connected to a drain set such that CSF drains when the ventricular pressure exceeds a threshold typically set at 10–20 mmHg. Intrathecal antibiotics may also be delivered through the EVD. 			
Ventriculoperitoneal shunts: <ul style="list-style-type: none"> • Ventriculoperitoneal (VP) shunting comprises insertion of a ventricular catheter, which may be antibiotic impregnated, into the frontal or occipital horn of the lateral ventricle, while a distal catheter is tunnelled subcutaneously to the abdomen. • Ventriculoatrial and ventriculopleural shunting is also possible. • A shunt valve, with an opening pressure, which may be high, medium or low, is inserted at the junction of these catheters. • Selection of the shunt valve is a balance and must be tailored to each patient: high pressure valves may fail to allow adequate CSF drainage, whereas low pressure valves can overdrain. 			
<table border="1"> <thead> <tr> <th>Shunt complications</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Over drainage can result in low-pressure headaches, which are typically worse on standing. • Collapse of the ventricles can cause accumulation of fluid in the subdural space, a subdural hygroma, or bleeding producing a subdural hematoma. • Shunts are vulnerable to infection and to blockage^Q, so that 15–20 per cent require replacement within three years. • 75% of infection presents within one month, a result of introduction at the time of insertion. <table border="1"> <tr> <td> <ul style="list-style-type: none"> • Risk factors include very young patients, open myelomeningocele, long operation time and staff movement in and out of theatre. </td> </tr> </table> • Majority of blockages are attributable to cellular and proteinaceous debris especially due to infection, but choroid plexus adhesion or blood clot may also be responsible. </td> </tr> </tbody> </table>	Shunt complications	<ul style="list-style-type: none"> • Over drainage can result in low-pressure headaches, which are typically worse on standing. • Collapse of the ventricles can cause accumulation of fluid in the subdural space, a subdural hygroma, or bleeding producing a subdural hematoma. • Shunts are vulnerable to infection and to blockage^Q, so that 15–20 per cent require replacement within three years. • 75% of infection presents within one month, a result of introduction at the time of insertion. <table border="1"> <tr> <td> <ul style="list-style-type: none"> • Risk factors include very young patients, open myelomeningocele, long operation time and staff movement in and out of theatre. </td> </tr> </table> • Majority of blockages are attributable to cellular and proteinaceous debris especially due to infection, but choroid plexus adhesion or blood clot may also be responsible. 	<ul style="list-style-type: none"> • Risk factors include very young patients, open myelomeningocele, long operation time and staff movement in and out of theatre.
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Endoscopic third ventriculostomy: <ul style="list-style-type: none"> • This procedure is especially useful in obstructive hydrocephalus due to aqueduct stenosis. • A neuroendoscope is inserted into the frontal horn of the lateral ventricle and then into the third ventricle via the foramen of Monro. • The floor of the ventricle is then opened between the mamillary bodies and the pituitary recess. • Free drainage between the third ventricle and the adjacent subarachnoid cisterns is then possible, without the infection risk posed by implanted tubing. 			

NERVE COMPRESSION SYNDROME

116. Ans a. Median nerve (Ref: Harrison 18/e p59-60; Sabiston 19/e p1983; Schwartz 10/e p1791, 9/e p1627-1628; Bailey 26/e p503, 25/e p511-512)

CARPAL TUNNEL SYNDROME

- Carpal tunnel syndrome is an **entrapment median neuropathy**^Q
- Causing **paresthesia, pain, numbness** in the distribution of the median nerve due to its **compression** at the wrist in the **carpal tunnel**.^Q

Risk factors for Carpal Tunnel Syndrome	
Pregnancy ^Q	Rheumatoid arthritis ^Q
Diabetes ^Q	Colle's fractures ^Q
Obesity ^Q	Amyloidosis ^Q
Hypothyroidism ^Q	Acromegaly ^Q
Heavy manual work or work with vibrating tools ^Q	Use of steroids and estrogens ^Q

Clinical Features

- Main symptom: Intermittent numbness of the thumb, index, long and radial half of the ring finger. Numbness often occurs at night^Q.
- Long-standing CTS leads to permanent nerve damage with constant numbness, atrophy of some of the muscles of the thenar eminence and weakness of palmar abduction.^Q
- Pain is primarily numbness that is so intense that it wakes one from sleep^Q.

Diagnosis

- Specific clinical tests include:
 - Tinel's Q percussion over the carpal tunnel
 - Phalen's test Q (reproduction of paraesthesia with full wrist flexion)
 - Carpal tunnel compression with full wrist flexion

- Rarely does electrophysiological testing add to the clinical tests, but it is a good tool for tracking changes.

Treatment

- Conservative treatments: Use of night splints and corticosteroid injection^Q.
- Disease modifying treatment: Surgery to cut the transverse carpal ligament^Q (creating space for the nerve)

117. Ans. c. Addison's disease

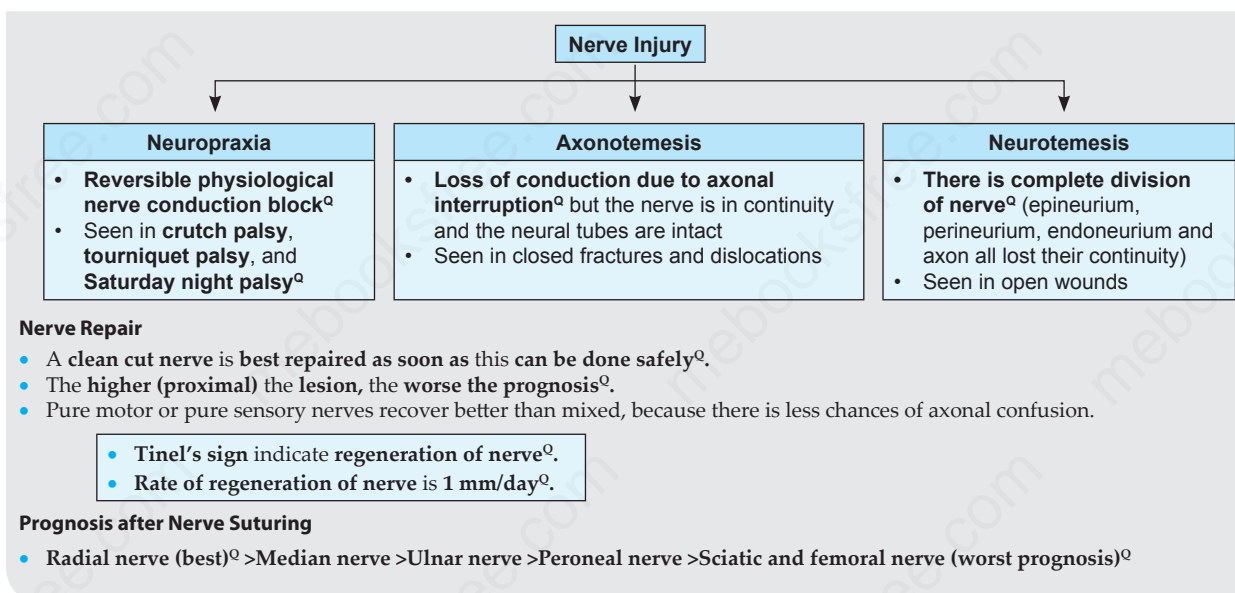
118. Ans. b. Median and sciatic (Ref: Schwartz 7/e p1906)

119. Ans. d. Pregnancy

120. Ans. c. Addison's disease

NERVE INJURIES

121. Ans. d. Regeneration of nerves (Ref: Schwartz 10/e p1798-1799,1805, 9/e p1532; Bailey 25/e p355)



122. Ans. b. Polio

124. Ans. d. 5th and 6th cervical nerves

123. Ans. e. When wound is free from infection

125. Ans. d. 4 hours

MISCELLANEOUS

126. Ans. a. Brain parenchyma

127. Ans. b. Cervicodorsal sympathectomy (Ref: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1468385/>)

NERVE OF KUNTZ

- Nerve of Kuntz: Thoracic origin of a sympathetic supply to the upper limb^Q
- An inconstant intrathoracic ramus which joined the 2nd intercostal nerve to the ventral ramus of the 1st thoracic nerve, proximal to the point where the latter gave a large branch to the brachial plexus, has become known as the 'nerve of Kuntz'
- These variant sympathetic pathways may be responsible for the recurrence of symptoms after sympathectomy surgery^Q.

128. Ans. b. Congenital syphilis

129. Ans. c. Echinococcosis

130. Ans. c. Decreased pH of CSF

131. Ans. a. Multiple sclerosis

132. Ans. d. Wilm's tumour

133. Ans. a. Diabetes mellitus

134. Ans. a. Congenital megacolon, b. Albinism

Defective migration of neural crest results in Hirschprung's disease (congenital megacolon), albinism, melanoma and oropharyngeal teratoma.

135. Ans. c. Eversion of galea aponeurotica (Ref: en.wikipedia.org/wiki/Galea_aponeurotica)

EVERSION OF THE GALEA APONEUROTICA

- Eversion of the galea aponeurotica in other words known as suturing the scalp wherein the galea will automatically get everted, is the best way to control the bleeding from scalp.
- Blood vessels in the scalp will not be able to contract and retract due to its firm attachment to galeal fibres. So they bleed profusely until the galea are approximated.

136. Ans. c. Arteriovenous malformation

- Diagnosis of AVM is made by conventional catheter cerebral angiography^Q
- Diagnosis is based on demonstration of arteries and veins on the same conventional angiographic image, proving the high-flow shunting of blood (leading to early filling of veins^Q) through the nidus network or fistulous vessels.
- In the typical AVM, there is a cloudlike nidus, or network of smaller vessels, well seen on angiography.

137. Ans. b. Temporal lobe (Ref: Harrison 18/e p3298; Sabiston 19/e p1904; Schwartz 10/e p1746-1747, 9/e p1551)

NEUROSURGICAL TREATMENT OF EPILEPSY

- The most common surgical procedures performed for epilepsy are anterior temporal lobectomy^Q, focal cortical resection, multiple subpial transection, hemispherectomy, and corpus callosotomy.

138. Ans. a. Fracture of orbit

139. Ans. c. Transtentorial herniation (Ref: Harrison 18/e p2248; Bailey 25/e p624)

KERNOHAN'S NOTCH PHENOMENON

- Kernohan's notch is a cerebral peduncle indentation associated with some forms of transtentorial herniation (uncal herniation)^Q.
- Compression of the contralateral cerebral peduncle against the free edge of the tentorium (Kernohan's notch) causes an ipsilateral hemiparesis with ipsilateral 3rd nerve palsy^Q.

KERNOHAN-WOLTMAN SIGN

- Lateral displacement of the midbrain may compress the opposite cerebral peduncle, producing a Babinski's sign and hemiparesis contralateral to the original hemiparesis (the Kernohan-Woltman sign^Q).

140. Ans. c. Constricted pupil

141. Ans. c. Vein of Galen malformation (Ref: Sabiston 19/e p1876)

Diagnosis of Vein of Galen malformation should be suspected in any newborn presenting with unexplained congestive heart failure and hydrocephalus.

- Vein of Galen is formed by the confluence of the two internal cerebral veins and receives the entire deep venous drainage of the cerebrum.
- Vein of Galen then joins the inferior sagittal sinus and empties the venous drainage into the straight sinus.

VEIN OF GALEN MALFORMATION

- Vein of Galen malformation is characterized by **aneurysmal dilatation** and **arteriovenous malformation** of Galen^Q.
- **Most commonly presents in the neonatal period**^Q

Clinical Features

- **High output failure, bounding carotid pulse, hydrocephalus**^Q
- Increased intra-cranial pressure, intraventricular hemorrhage from rupture.
- **Cerebral ischemia from intracranial 'steal' phenomenon and CHF**^Q.
- **Marked continuous cranial bruit**^Q

Diagnosis

- **Cranial ultrasonography: Initial investigation of choice**^Q
- MRI and Angiography: Used to define the lesion better

CNS Tumors

MULTIPLE CHOICE QUESTIONS

CNS TUMORS PREDISPOSING FACTORS

- All of the following hereditary conditions predispose to CNS tumors, except:** (DPG 2010, AIIMS 2005)
 - Neurofibromatosis 1 and 2
 - Tuberous sclerosis
 - Von-Hippel-Lindau syndrome
 - Xeroderma pigmentosum
- All of the following statements about Neurofibromatosis are true, except:** (All India 2009)
 - Autosomal recessive inheritance
 - Cutaneous neurofibromas
 - Cataract
 - Scoliosis
- Which of the following is the most common tumor associated with type-1 neurofibromatosis?** (AIIMS Nov 2007, May 2003)
 - Optic nerve glioma
 - Meningioma
 - Acoustic schwannoma
 - Low grade astrocytoma
- Neurofibromatosis type-2 is associated with:** (PGI Dec 2000)
 - Bilateral acoustic schwannoma
 - Multiple café-au-lait spots
 - Chromosome-22
 - Lisch nodule
 - Posterior subcapsular lenticular cataract
- Widened neural foramina is frequently seen in:** (All India 2012)
 - Neurofibromatosis
 - Tuberous sclerosis
 - Sturge-Weber syndrome
 - Klippel-Fiel syndrome
- All of the following may be associated with Von-Hippel Lindau syndrome, except:** (All India 2009)
 - Retinal and cerebella hemangioblastomas
 - Gastric carcinoma
 - Pheochromocytoma
 - Renal cell carcinoma
- In Von-Hippel Lindau syndrome, the retinal vascular tumours are often associated with intracranial hemangioblastoma. Which one of the following regions is associated with such vascular abnormalities in this syndrome?** (All India 2005)
 - Optic radiation
 - Optic tract
 - Cerebellum
 - Pulvinar
- Which of the following statement about VHL syndrome is true?** (All India 2012)
 - Multiple tumors are rarely seen
 - Craniospinal hemangioblastoma are common
 - Supratentorial tumors are common
 - Tumors of Schwann cells are common
- Neurofibromatosis-2 is/are associated with:** (PGI Nov 2011)
 - Meningioma
 - Schwannoma
 - Glioma
 - Lisch nodule
 - Hearing loss
- A child presents to the clinic with history of seizures and mental retardation. Clinical examination reveals multiple hypopigmented macules. What is the likely diagnosis?** (All India 2010)
 - Tuberous Sclerosis
 - Neurofibromatosis
 - Sturge Weber Syndrome
 - Linear epidermal nevus syndrome
- The diagnosis of a patient presenting with seizures, mental retardation and sebaceous adenoma is:** (All India 95)
 - Hypothyroidism
 - Tuberous sclerosis
 - Toxoplasmosis
 - Down syndrome
- Triad of tuberous sclerosis includes all, except:** (All India 2009)
 - Epilepsy
 - Adenoma sebaceum
 - Low intelligence
 - Hydrocephalus
- Adenoma sebaceum is a feature of:** (AIIMS 2005)
 - Neurofibromatosis
 - Tuberous sclerosis
 - Xanthomatosis
 - Incontinentia pigmenti
- CNS tumor seen in Von Hippel Lindau syndrome is:** (PGI Dec 99)
 - Meningioma
 - Cerebellar hemangioblastoma
 - CNS lymphoma
 - Glioma
- Neurofibromatosis is associated with:** (PGI Dec 98)
 - Papillary carcinoma
 - Islet cell tumour
 - Pheochromocytoma
 - Glucagonoma
- Plexiform neurofibromatosis commonly affects:** (JIPMER 87)
 - Facial nerve
 - Trigeminal nerve
 - Peripheral nerve
 - Glossopharyngeal nerve
- Musculoskeletal abnormality in neurofibromatosis is:** (PGI 86)
 - Hypertrophy of limb
 - Scoliosis
 - Café au lait spots
 - Pseudo arthrosis
 - All

18. Neurofibromatosis presents as all of the following except: (UPSC 2001)
- Elephantiasis neuromatosa
 - Plexiform neuroma
 - Von Recklinghausen's disease
 - Lymphadenovarix
19. Brain tumor is associated with all except: (PGI Dec 99)
- Tuberous sclerosis
 - Von Hippel Landau syndrome
 - Neurofibromatosis
 - Sturge-Weber syndrome
20. What is not a feature of Sturge-Weber syndrome?
- Rail track appearance
 - Hemiatrophy of the brain
 - Convulsion
 - Empty sella

CNS TUMORS: CLINICAL FEATURES AND TREATMENT

21. A 55-years old female presents with grade I Ependymoma extending from C7-T1 with no neural defect. Surgery is done, next management is: (DPG 2008)
- Post-op chemotherapy
 - Post-op chemoradiation
 - Imaging, regular follow up, chemotherapy if required
 - Imaging, regular follow up, radiotherapy if required
22. Psychiatric symptoms, true except: (PGI 2000)
- More common with supra than infra tentorial tumors
 - More common with slow growing
 - More with temporal than frontal lobe tumours
 - More with brain stem lesions
23. Which of the following tumor is not known to increase in pregnancy? (All India 2006)
- Glioma
 - Pituitary adenoma
 - Meningioma
 - Neurofibroma
24. Which one of the following tumors shows calcification on CT scan? (All India 2005)
- Ependymoma
 - Medulloblastoma
 - Meningioma
 - CNS lymphoma
25. Stereotactic radiosurgery is done for: (JIPMER 2002)
- Glioblastoma multiforme
 - Medulloblastoma spinal cord
 - Ependymoma
 - AV malformation of brain
26. Which of the following brain tumors doesn't spread via CSF? (DPG 2011, All India 2004)
- Germ cell tumor
 - Medulloblastoma
 - CNS Lymphoma
 - Craniopharyngioma
27. The characteristic feature of a frontal lobe tumor is: (All India 94)
- Abnormal gait
 - Aphasia
 - Distractibility
 - Antisocial behavior
28. Prophylactic craniospinal irradiation is recommended in: (PGI 2007)
- Gemistocytic astrocytoma
 - Posterior fossa ependymoma
 - Meningioma
 - Medulloblastoma
29. All of the following tumors may be malignant except: (All India 97)
- Glioma
 - Astrocytoma
 - Hemangioblastoma
 - Ependymoma
30. The CNS tumor present with calcification: (PGI June 99)
- Oligodendroglioma
 - Astrocytoma
 - Medulloblastoma
 - Pheochromocytoma
31. Lowest incidence of cerebral tumours is seen in: (AIIMS 85)
- Occipital
 - Frontal
 - Temporal
 - Parietal
32. Cerebellar hemangioblastoma and retinal tumours are seen in: (JIPMER 2012)
- VHL syndrome
 - NF-1
 - Tuberous sclerosis
 - NF-2

BRAIN METASTASIS

33. Which of the following carcinoma most frequently metastasizes to brain? (AIIMS 2005)
- Small cell carcinoma lung
 - Prostate cancer
 - Rectal carcinoma
 - Endometrial cancer
34. Most common site of brain metastasis: (DNB 2011)
- Brainstem
 - Cerebellum
 - Cerebral cortex
 - Thalamus

ASTROCYTOMA

35. Which of the following is the most common type of glial tumors? (All India 2006)
- Astrocytomas
 - Medulloblastomas
 - Neurofibromas
 - Ependymomas
36. In children most common posterior fossa tumour is: (AIIMS Dec 95)
- Meningiomas
 - Astrocytoma
 - Medulloblastoma
 - Glioblastoma multiforme
37. Glioblastoma multiforme may occur in the following except: (DPG 93)
- Cerebrum of adult
 - Brain stem of child
 - Spinal cord of adult
 - Adrenal medulla of child
38. Which of the following brain tumors is highly vascular in nature? (AIIMS May 2006)
- Glioblastoma
 - Meningiomas
 - CP angle epidermoid
 - Pituitary adenomas
39. Most common intracranial neoplasm in adults is: (AIIMS May 93, May 94)
- Meningioma
 - Astrocytoma
 - Posterior fossa tumor
 - Ganglioneuroma
40. Which of the following statements about cerebellar astrocytomas in pediatric age group is false? (All India 2008)
- These are usually low grade tumors
 - These are more commonly seen in the 1st and 2nd decades
 - These tumors have a good prognosis
 - These tumors are more common in females
41. Most common site of sub ependymal astrocytoma (Giant cell): (AIIMS Nov 2007)
- Trigone of lateral ventricle
 - Foramen of Monro
 - Temporal horn of lateral ventricle
 - 4th ventricle
42. Glioblastoma multiforme is a variant of: (COMEDK 2005)
- Medulloblastoma
 - Meningioma
 - Astrocytoma
 - Neuroblastoma
43. All are true regarding pilocytic astrocytoma, except: (AIIMS May 2009)
- Seen in elderly above 80 years
 - Seen in posterior fossa
 - Good prognosis
 - Most common primary brain tumor in children

44. A child present with raised ICT. On CT scan, a lesion is seen around foramen of Monroe and multiple periventricular calcific foci. What is the most probable diagnosis? (AIIMS Nov 2011)
- Central neurocytoma
 - Ependymoma
 - Subependymal giant cell astrocytoma
 - Ganglioglioma

MEDULLOBLASTOMA

45. Which of the following is true about medulloblastoma? (PGI Dec 2005)
- Radiosensitive tumor
 - Spreads through CSF
 - Surgical treatment is not done
 - Occurs in young age group
 - It is a supratentorial tumor
46. Chang staging is used for? (AIIMS May 2010)
- Retinoblastoma
 - Medulloblastoma
 - Ewing's sarcoma
 - Rhabdomyosarcoma
47. Long term effect of craniospinal irradiation for medulloblastoma is: (JIPMER 2011)
- Secondary malignancy
 - Neuro endocrine abnormalities
 - Neurocognitive effects
 - Hearing loss

48. Medulloblastoma exclusively occurs in the:

- Medulla
- Cerebellum
- Cerebral hemisphere
- Spinal cord

49. True about medulloblastoma is: (AIIMS Nov 95)
- Highly radiosensitive
 - Surgery is the only treatment
 - Occurs in adult age group
 - Chemotherapy is useful

MENINGIOMA

50. A 45-years old female complains of progressive lower limb weakness, spasticity, urinary hesitancy. MRI shows intradural enhancing mass lesion. Most likely diagnosis is: (AIIMS Nov 2011, Nov 2006, All India 2007)
- Dermoid cyst
 - Intradural lipoma
 - Neuroepithelial cyst
 - Meningioma
51. Radiological features of meningioma: (PGI 2009)
- Calcification
 - Erosion
 - Sutural diastasis
 - Osteosclerosis
 - Vascular erosion
52. A 48-years old woman comes with bilateral progressive weakness of both lower limbs, spasticity and mild impairment of respiratory movements. MRI shows an intradural mid-dorsal midline enhancing lesion. What is the diagnosis? (AIIMS May 2010)
- Intradural lipoma
 - Meningioma
 - Neuroenteric cyst
 - Dermoid cyst

53. Best prognosis among following is seen in: (DNB 2007)

- Astrocytoma
- Oligodendroglioma
- Meningioma
- Medulloblastoma

54. Extra-axial intracranial lesion showing contrast enhancement on MRI: (All India 2012)
- Meningioma
 - Ependymoma
 - Arachnoid cyst
 - Astrocytoma

55. A lady had meningioma with inflammatory edematous lesion. She was planned for surgery. Junior resident mistake in writing pre-op notes is: (AIIMS May 2012)

- Stop steroids
- Wash head with shampoo
- Antibiotic sensitivity
- Continue antiepileptics

56. All of the following tumors usually show psammoma bodies except?: (MHCET 2016)

- Papillary carcinoma of thyroid
- Meningioma
- Serous cystadenoma of ovary
- Hepatocellular carcinoma

CRANIOPHARYNGIOMA

57. Suprasellar calcification with polyuria seen in: (PGI Dec 2002)
- Langerhan cell histiocytosis
 - Medulloblastoma
 - Pinealoma
 - Craniopharyngioma
 - Astrocytoma
58. A 6-years old boy has been complaining of headache, ignoring to see the objects on the sides for four months. On examination, he is not mentally retarded, his grades at school are good, and visual acuity is diminished in both the eyes. Visual charting showed significant field defect. CT scan of the head showed suprasellar mass with calcification. Which of the following is the most probable diagnosis? (AIIMS Nov 2004, 2005)

- Astrocytoma
- Craniopharyngioma
- Pituitary adenoma
- Meningioma

59. A six year old child managed by complete surgical removal of craniopharyngioma developed multiple endocrinopathies. Which of following hormones should be replaced first? (All India 2011)

- Hydrocortisone
- Growth Hormone
- Thyroxine
- Prolactin

60. Which of the following is the most common cause of a mixed cystic and solid suprasellar mass seen on cranial MR scan of a 10 years old child? (AIIMS 2005)

- Pituitary adenoma
- Craniopharyngioma
- Optic chiasmal glioma
- Germinoma

61. All the following are true of craniopharyngioma except: (All India 94)

- Derived from Rathke's pouch
- Contains epithelial cells
- Present in sella or infra-sellar location
- Causes visual disturbances

PITUITARY ADENOMA

62. Which of the following is true about pituitary adenoma? (PGI Dec 2005)
- Accounts for 10% of brain tumors
 - Erodes the sellar and extends into surrounding area
 - Prolactinoma is least common
 - It is differentiated by reticulin stain
63. The most preferred approach for pituitary surgery at the present time is: (All India 2006)
- Transcranial
 - Transethmoidal
 - Transphenoidal
 - Transcallosal
64. A 35 years old female with amenorrhea, galactorrhea has bitemporal hemianopia. The most probable diagnosis is: (JIPMER 2010)
- GnRH adenoma
 - Sellar chordoma
 - Craniopharyngioma
 - Prolactin secreting pituitary microadenoma

65. A 30 years old male complains of loss of erection; he has low testosterone and high prolactin level in blood; what is the likely diagnosis? (All India 2001)

- Pituitary adenoma
- Testicular failure
- Craniopharyngioma
- Cushing's syndrome

66. Most common cause of hypersecreting pituitary tumour is: (DNB 2009)

- Pituitary adenoma
- Pituitary carcinoma
- Autoimmune disease of pituitary
- Transection of stalk

SPINAL TUMORS

67. The commonest extradural spinal tumour is: (NIMHANS 86)

- Neurofibroma
- Glioma
- Meningioma
- Metastasis

68. Commonest spinal tumour is: (SCTIMS 98)

- Meningioma
- Ependymoma
- Neurofibroma
- Neuroblastomas

69. Most common location of spinal tumors: (AIIMS Nov 2007)

- Intramedullary
- Intradural extramedullary
- Extradural
- Equally distributed

CNS LYMPHOMA

70. True about primary CNS lymphoma: (PGI 2009)

- Reticulin staining done
- Essentially B-cell type
- Associated with EBV
- Indolent disease with good prognosis
- Chemotherapy highly effective

71. All are true regarding Primary CNS lymphoma except:

- Radiotherapy and chemotherapy is of no value
- Occurs in AIDS patients (AIIMS Feb 97)
- Commonly occurs in immune-compromised persons
- EBV may be a cause

SCHWANNOMA AND NEUROFIBROMA

72. Dumbbell tumor is seen in: (GB Pant 2011)

- Meningioma
- Neurofibroma
- Ependymoma
- Thymoma

73. Vestibular schwannoma arises most frequently from:

- Superior vestibular nerve
- Inferior vestibular nerve
- Cochlear nerve
- Facial nerve

MISCELLANEOUS

74. Commonest orbital tumour causing exophthalmos is:

- Glioma
- Meningioma (AIIMS 87)
- Hemangioma
- Neuroblastoma

75. Which of the following is primary neurogenic tumour?

- Meningioma
- Glioblastoma
- Acoustic neuroma
- Neuroblastoma

76. Witzelsucht syndrome (i.e. "Pathological Joking") is seen in: (JIPMER 88, All India 90)

- Frontal lobe tumours
- Parietal lobe tumours
- Temporal lobe tumours
- Intra Ventricular tumours

77. MRI is the investigation of choice in all of the following except: (COMEDK 2007, 2004)

- Syringomyelia
- Brain stem tumors
- Skull bone tumors
- Multiple sclerosis

78. All of the following are neuronal tumors, except:

(All India 2011)

- Gangliocytoma
- Ganglioglioma
- Neurocytoma
- Ependymoma

79. A 20-years female patient with 6th cranial nerve palsy on T2 weighted MRI shows a hyperintense lesion in cavernous sinus which shows homogenous contrast enhancement. Most probable diagnosis is: (AIIMS Nov 2010)

- Schwannoma
- Meningioma
- Cavernous sinus hemangioma
- Astrocytoma

80. Imaging modality of choice for detecting radiation induced cerebral necrosis: (AIIMS Nov 2009, 2005)

- PET scan
- Biopsy
- MRI
- CT

81. Not a neuroglial tumor:

(Kerala 95)

- Schwannoma
- Astrocytoma
- Medulloblastoma
- Ependymoma

82. Investigation of choice for leptomeningeal carcinomatosis:

- PET Scan
- SPECT (AIIMS Nov 2011)
- Gd enhanced MRI
- CT scan

83. A patient was diagnosed with intracranial cavernous angioma on MRI. MRI finding characteristic of this lesion is: (AIIMS Nov 2011)

- Well defined nidus
- Definite arterial feeders
- Phlebectasis
- Popcorn like lesion

84. All of the following are true about long terms sequel of cranio spinal radiotherapy for children with CNS tumors except:

(All India 2012)

- Neurocognitive dysfunction
- Endocrinologic dysfunction
- Musculoskeletal hypoplasia
- Neuropsychological sequel are independent of radiation dose

85. Enlargement of pituitary tumour after adrenalectomy is called as: (DNB 2009)

- Nelson syndrome
- Steel-Richardson syndrome
- Hamman-Rich syndrome
- Job's syndrome

86. Stereotactic surgery is used for treatment of:

(AIIMS Nov 2012)

- Brain tumor
- Lungs carcinoma
- Cervix cancer
- Renal carcinoma

87. Highly vascular tumor of brain and spinal cord in adults:

(AIIMS May 2013)

- Metastasis
- Pilocytic astrocytoma
- Hemangioblastoma
- Cavernous malformation

EXPLANATIONS

CNS TUMORS PREDISPOSING FACTORS

1. Ans. d. Xeroderma pigmentosum (Ref: Harrison 18/e p3384; Bailey 26/e p612, 25/e p631)

Hereditary syndromes associated with Brain tumours		
Syndrome	Gene (locus)	CNS neoplasm
• von Hippel-Lindau	VHL (3p) ^a	Hemangioblastoma of retina, cerebellum, and spinal cord; pheochromocytoma ^a
• Li-Fraumeni	p53 (17p) ^a	Malignant glioma
• Retinoblastoma	Rb (13q) ^a	Retinoblastoma, pineoblastoma, malignant glioma ^a
• Neurofibromatosis type 1 (Von Recklinghausen's disease)	NF1 (17q) ^a	Neuroma, Schwannoma, meningioma, optic glioma ^a
• MEN 1 (Wermer syndrome)	MEN1 (11q) ^a	Pituitary adenoma, malignant schwannoma ^a
• Turcot's syndrome	APC (5q) ^a	Medulloblastoma, malignant glioma ^a
• Gorlin (basal cell nevus)	PTCH (9q)	Medulloblastoma
• Tuberous sclerosis	TSC1 (9q)	Astrocytoma ^a
	TSC2 (16p)	
• Neurofibromatosis 2	NF2 (22q) ^a	Schwannoma, glioma, ependymoma ^a

2. Ans. a. Autosomal recessive inheritance (Ref: Harrison 18/e p3389-3390; Sabiston 19/e p705; Schwartz 10/e p677, 1468, 9/e p1285; Bailey 26/e p612, 25/e p631, 597)

Neurofibromatosis	
Neurofibromatosis-1	Neurofibromatosis-2
<ul style="list-style-type: none"> Also known as peripheral neurofibromatosis or von-Recklinghausen's syndrome^a Most prevalent type (90%)^a NF-1 gene: Chromosome 17^a Autosomal dominant^a Diagnostic Criteria for NF-1 (Diagnosed when any two of the following are present): <ol style="list-style-type: none"> ≥6 café-au-lait macules^a >5 mm in greatest diameter in prepubertal individuals and >15mm in greatest diameter in post-pubertal individuals. Axillary or inguinal freckling^a ≥2 iris Lisch nodules^a ≥2 neurofibromas or one plexiform neurofibroma^a Sphenoid dysplasia or cortical thinning of long bone, with or without pseudoarthrosis Optic gliomas^a A first degree relative with NF-1 whose diagnosis was based on the aforementioned criteria. 	<ul style="list-style-type: none"> Also known as central neurofibromatosis or bilateral acoustic neurofibromatosis^a Less prevalent (10%) NF-2 gene: Chromosome 22^a Autosomal dominant^a Diagnostic Criteria for NF-2^a (Diagnosed when any one of the following is present): <ol style="list-style-type: none"> Bilateral 8th nerve masses consistent with acoustic neuromas^a A parent, sibling, or child with NF-2 and either Unilateral 8th nerve mass or any two of the following: <ul style="list-style-type: none"> Neurofibroma^a Meningioma^a Glioma^a Schwannoma^a <div> <ul style="list-style-type: none"> Bilateral acoustic neuromas are the most distinctive tumors in patients with NF-2^a. </div>

3. Ans. a. Optic nerve glioma
4. Ans. a. Bilateral acoustic schwannoma, c. Chromosome -22, e. Posterior subcapsular lenticular cataract
5. Ans. a. Neurofibromatosis (Ref: Differential Diagnosis in Conventional Radiology (Thieme) 2007/260)
- Widened neural foramina (wide intervertebral foramina) are frequently associated with NF-1^a.

6. Ans. b. Gastric carcinoma (Ref: Harrison 18/e p3384; Sabiston 19/e p705; Schwartz 9/e p247; Bailey 25/e p95)

Von Hippel Lindau Syndrome (AD)	
Characteristic Tumors/Cysts	Other tumors/Cysts
<ul style="list-style-type: none"> • Hemangioblastomas: <ul style="list-style-type: none"> – Cerebellar hemangioblastoma^Q – Retinal hemangioblastoma^Q – Spinal hemangioblastoma^Q 	<ul style="list-style-type: none"> • RCC^Q • Pheochromocytoma^Q • Pancreatic endocrine tumors • Adrenal carcinomas • Benign cysts in kidney, epididymis, liver or pancreas^Q

- Polycythemia is a characteristic feature in VHL due to erythropoietin production by hemangioblastoma and/or RCC^Q.

7. c. Cerebellum

8. Ans. b. Craniospinal hemangioblastoma are common

9. Ans. a. Meningioma, b. Schwannoma, c. Glioma, e. Hearing loss

10. Ans. a. Tuberous Sclerosis (Ref: Roxburgh's 17/e p201; Harrison 18/e p3390)

Tuberous Sclerosis / Epiloia / Bourneville's disease		
Skin lesion	Neurological	Benign Neoplasm
<ul style="list-style-type: none"> • Adenoma sebaceum^Q (facial angiofibroma) • Ash leaf shaped hypopigmented macules^Q • Shagreen Patch^Q- yellow thickening of lumbosacral skin • Depigmented nevi 	<ul style="list-style-type: none"> • Seizure^Q • Mental retardation^Q • Subependymal nodules^Q which may calcify • Hydrocephalus^Q 	<ul style="list-style-type: none"> • Rhabdomyoma^Q • Angiomyoma^Q of liver, kidney, pancreas etc. • Ependymoma^Q • Astrocytoma^Q

11. Ans. b. Tuberous sclerosis

12. Ans. d. Hydrocephalus

13. Ans. b. Tuberous sclerosis

14. Ans. b. Cerebellar hemangioblastoma

15. Ans. c. Pheochromocytoma

16. Ans. b. Trigeminal nerve

17. Ans. e. All

18. Ans. d. Lymphadenovarium

- Elephantiasis neuromatosa is the most impressive manifestation of NF-1.

19. Ans. d. Sturge-Weber syndrome

20. Ans. d. Empty sella (Ref: Bailey 26/e p599, 25/e p618)

STURGE-WEBER SYNDROME / ENCEPHALOTRIGEMINAL SYNDROME

- Usually sporadic, characterized by:
 - Large unilateral cutaneous angioma^Q (port-wine stain)
 - Angiomas in brain involving ipsilateral cerebral hemisphere and meninges
 - Focal seizures^Q typically occurs opposite to the side of lesion^Q
 - Adrenal pheochromocytoma
 - Cerebral angiomas lead to cortical atrophy^Q

- Angiomas are visible radiologically as Tram-track or rail track calcification mainly in occipital region^Q

CNS TUMORS CLINICAL FEATURES AND TREATMENT

21. Ans. d. Imaging, regular follow up, radiotherapy if required (Ref: Harrison 18/e p3387; Sabiston 19/e p1888; Schwartz 10/e p1734, 1738, 9/e p1540; Bailey 25/e p474)

- Harrison says "Following the gross total excision of an Ependymoma, the prognosis is excellent. The five year disease free survival is >80%. However, many ependymoma cannot be totally excised, and postoperative focal external beam radiation or stereotactic radiosurgery is used."

EPENDYMOMA

- Arise from the ependymal lining of the cerebral hemispheres and remnants of the central canal of the spinal cord.
- Manifest predominantly in children (within the fourth ventricle) and young adults.

- **MC histologic type in adults:** Myxopapillary ependymoma^Q, which typically arises from the **filum terminale^Q** of the spinal cord and appears in the **lumbosacral region^Q**.

Diagnosis

- On CT or MRI, ependymomas typically appear as **diffusely enhancing masses^Q** relatively well demarcated from adjacent neural tissue.
- MRI findings include a **well-circumscribed** lesion with varying degrees of enhancement. **Ventricular or brainstem displacement** and **hydrocephalus** are frequent features.

Treatment

- Optimal treatment includes **maximal possible resection** without causing neurological deficits followed by EBRT.
- Ependymomas have the potential to **spread through the neuraxis** by **seeding** of the CSF; **craniospinal radiation^Q** is recommended in this case.

22. Ans. b. More common with slow growing, c. More with temporal than frontal lobe tumours (Ref: Kaplan and Sadock's Concise Textbook of Clinical Psychiatry (2008)/74)

PSYCHIATRIC SYMPTOMS IN BRAIN TUMORS

- **Mental changes** are likely to occur in patients with **supratentorial tumors**, and more commonly among patients with tumors of the **frontal and temporal lobes**.
 - Psychiatric symptoms are **more common in frontal lobe tumors^Q**.
 - Depression: **More common in frontal lobe tumors^Q**
 - Psychosis: **More common in temporal lobe tumors^Q**
- **Left sided frontal tumors** are more commonly associated with **akinesia** and **depression**, while **right sided lesions** are more often associated with **euphoria**.
- **Delirium** is most often a component of **rapidly growing^Q, large, or metastatic tumors**.

23. Ans. a. Glioma (Ref: CGDT 9/e p429)

- Although brain tumors are not specifically related to gestation, **meningiomas**, **angiomas**, and **neurofibromas** are thought to grow more rapidly with pregnancy^Q.

24. Ans. c. Meningioma (Ref: Sutton Radiology 7/e p1739)

- Meningioma range from **firm and fibrous to finely gritty** or they may be **extremely calcified** with **Psammoma bodies^Q**.
- Calcification is also seen in ependymoma, but **more common in meningioma^Q**.

25. Ans. d. AV malformation of brain (Ref: Sabiston 19/e p1900-1902; Schwartz 10/e p1749, 9/e p1552-1553)

STEREOTACTIC RADIOSURGERY

- Stereotactic radiosurgery involves the delivery of a **concentrated dose of radiation to a defined volume** in the **brain^Q**.

Two methods of frame-based stereotactic radiosurgery are currently widely used.

- **Gamma knife** uses **cobalt-201^Q** radiation sources focused on one point.
- **Modified linear accelerators^Q** deliver the radiation dose in multiple arcs, thereby minimizing the effect on surrounding brain tissue.

- **Primary risks** of stereotactic radiosurgery are **radiation necrosis** and **radiation injury** to surrounding structures.

Common uses of Stereotactic Radiosurgery

- | | |
|--|---|
| <ul style="list-style-type: none"> • Metastatic tumors • Benign lesions of the cranial nerves | <ul style="list-style-type: none"> • Arteriovenous malformations^Q • Trigeminal neuralgia |
|--|---|

26. Ans. d. Craniopharyngioma (Ref: Harrison 18/e p3382-3388)

Tumors that spread through CSF

- | | |
|--|--|
| <ul style="list-style-type: none"> • Medulloblastoma^Q • Pinealoblastomas^Q • Germ cell tumors^Q • CNS Lymphomas^Q | <ul style="list-style-type: none"> • Primitive neuroectodermal tumors • Anaplastic ependymomas • Choroid plexus carcinoma |
|--|--|

27. Ans. d. Antisocial behavior (Ref: en.wikipedia.org/wiki/Witzelsucht)

FRONTAL LOBE TUMORS

- Personality changes are common symptom of frontal lobe tumor.
 - Frontal lobe controls behavior and judgment^Q.
 - Patients may be socially disinhibited, display antisocial behavior, shows severe impairment of judgment, insight and foresight^Q.
- Witzelsucht syndrome: Self amusement from poor jokes and puns, also known as pathological joking, is seen in frontal lobe tumors^Q

28. Ans. d. Medulloblastoma (Ref: Harrison 18/e p3388)

PROPHYLACTIC CRANIOSPINAL IRRADIATION

- Prophylactic craniospinal irradiation is useful in CNS malignancy which disseminate via CSF or any malignancy with high risk of CNS spread^Q.

Common Manifestations	Less Common Manifestation
<ul style="list-style-type: none"> • Medulloblastoma^Q • Glioblastoma^Q • Germinoma^Q • Small cell Ca of lung^Q 	<ul style="list-style-type: none"> • ALL^Q • Non hodgkin's lymphoma^Q • Leptomeningeal Rhabdomyosarcoma^Q

29. Ans. c. Hemangioblastoma (Ref: Harrison 18/e p793; Sabiston 19/e p1888; Schwartz 10/e p1735-1736, 9/e p1541)

HEMANGIOBLASTOMA

- Hemangioblastoma represents the MC primary intra-axial tumor in the adult posterior fossa^Q
- Occur almost exclusively in the posterior fossa (cerebellum^Q)
- Solid or cystic with a mural nodule^Q

- May occur sporadically, and 20% of cases may be associated with von Hippel-Lindau disease (hemangioblastomas, retinal angiomas, RCC, pheochromocytoma, renal and pancreatic cysts)^Q.

Pathology

- Histologically benign^Q, and may be associated with erythrocytosis^Q.
- Appear as cystic tumors with an enhancing tumor on the cyst wall known as the mural nodule
- Pathology reveals abundant thin-walled vascular channels^Q

Treatment

- Surgical resection is curative for sporadic (non-VHL associated) tumors^Q.
- En-bloc resection of the mural nodule alone, leaving the cyst wall, is sufficient^Q.

30. Ans. a. Oligodendroglioma (Ref: Harrison 18/e p3386; Sabiston 19/e p1887; Schwartz 10/e p1733, 9/e p1539; Bailey 26/e p613, 25/e p632)

OLIGODENDROGLIOMA (ODG)

- ODG accounts for approximately 10% of gliomas
- Predilection for the cortex and white matter of the cerebral hemispheres (frontal lobe in 50–65%)
- MC genetic alterations include loss of heterozygosity on chromosome 19q >1p^Q. These alterations are usually associated with a better prognosis.

- Characterized by classic histologic feature of "fried egg" cytoplasm, "chicken wire" vasculature, and microscopic calcifications^Q.

Clinical Features

- This tumor frequently presents with seizures

Diagnosis

- Calcifications and hemorrhage on CT or MRI suggest the diagnosis^Q.
- Calcifications is seen in 28-60% in ODGs on plain radiographs, and on 90% of CT^Q.

Treatment

- Primary modality of treatment: **Surgical resection + Chemotherapy^Q**
- Respond to **procarbazine**, lomustine (CCNU), vincristine (PCV) **chemotherapy**.
- Chromosomal deletion, **1p** and **19q**, has been associated with **robust response to temozolomide^Q**.

Prognosis

- **Median survival time** ranges from **3–5 years**

31. Ans. a. Occipital

32. Ans. a. VHL syndrome

BRAIN METASTASIS

33. Ans. a. Small cell carcinoma lung (Ref: Harrison 18/e p3390)

METASTATIC BRAIN TUMORS

- Metastatic brain tumors are the **MC tumors** of the **brain^Q**.
- They outnumber primary brain tumors by **10 to 1**.
 - **Location: Cerebral hemispheres (80%)** mainly the **frontal lobes^Q**, cerebellum (15%) and brainstem (5%).
 - **MC primary sites: CA lung^Q (50%) > breast cancer^Q (15-20%)**
- Metastases to the brain are **multiple** in **>70%** of cases.

Diagnosis

- **IOC: MRI** with **gadolinium** enhancement^Q
- Lesions are at the **gray-matter** and **white-matter junction**, **well circumscribed**, surrounded by **edema^Q**.

Treatment

- **Surgery** is recommended for accessible lesions (**up to 3**) causing mass effect followed by **whole-brain radiation therapy (WBRT)** to **eradicate micrometastases^Q**.
- **Stereotactic radiosurgery** followed by **WBRT** has also been shown to be as effective as surgery in the management of metastatic brain tumors (**<3 cm**).
- **Chemotherapy** is not useful in most brain metastases except **small cell lung cancer** and **seminomas**.

Prognosis

- **Median survival time** with optimal treatment: **7–12 months**

34. Ans. c. Cerebral cortex

ASTROCYTOMA

35. Ans. a. Astrocytomas (Ref: Harrison 18/e p3384–3386; Sabiston 19/e p1886; Schwartz 10/e p1733, 1738–1739, 9/e p1539; Bailey 26/e p613, 25/e p632)

GLIOMA

- Astrocytoma (MC)
- Oligodendroglioma^Q
- Ependymoma^Q
- Astrocytoma is mostly **supratentorial** in adults and **infratentorial** in children^Q
 - Astrocytoma is MC posterior fossa tumor in children^Q
- Majority of astrocytomas are **low-grade** in children and **high grade** in adulthood^Q.
- In children, **pilocytic astrocytoma** is **most common^Q**.
- In adults, **diffuse astrocytoma** is **most common^Q**.

36. Ans. b. Astrocytoma

37. Ans. d. Adrenal medulla of child

38. Ans. a. Glioblastoma (Ref: Harrison 18/e p3384–3386; Osborn Neuroradiology (1994)/541, 591)

- Osborn says “**Glioblastoma** is **highly vascular**, sometimes so vascular that it **resembles an AV malformation on angiography**.”

WHO Classification of Astrocytoma			
Grade I or Pilocytic Astrocytoma	Low-grade, or grade II astrocytomas	Grade III or Anaplastic	Grade IV or Glioblastoma multiforme
<ul style="list-style-type: none"> Discrete appearing, contrast enhancing and often cystic with a mural nodule^Q. Mean age: First two decades of life. Curable by radical resection^Q (no infiltration of surrounding brain) Radiation therapy and chemotherapy have no role Median survival time: 8-10 years. 	<ul style="list-style-type: none"> Occur in children and young adults^Q. Most patients present with seizures^Q. Typically demonstrate nuclear atypia; have a low degree of cellularity Treatment: Observation and follow-up, radiation with or without chemotherapy, and surgery. Surgery is not curative because most of these tumors are infiltrative with no clear margins^Q. The median survival time is 7-8 years. 	<ul style="list-style-type: none"> Irregular enhancement on MRI Treatment: Cytoreductive surgery followed by EBRT^Q. Median survival time for anaplastic astrocytoma: 2-3 years 	<ul style="list-style-type: none"> MC primary brain tumor^Q Endothelial proliferation or necrosis^Q on histology makes the tumor grade IV. Seen in older patients (>50 years). GBMs: Ring enhancement with central necrosis on MRI^Q. Treatment: Cytoreductive surgery followed by EBRT^Q. The extent of tumor resection has a significant effect on time to tumor progression and median survival^Q. Carmustine and cisplatin have been the primary agents used against malignant gliomas^Q. Temozolomide^Q has shown some promise in the management of newly diagnosed and recurrent GBM, with an overall survival time of 13.6 months. Median survival time for GBM is <1 year.

ASTROCYTOMA

- Astrocytomas arise from **astrocytes** and account for **50% of all primary brain tumors**^Q.
- Astrocytomas represent the **MC glioma in children**, representing 10% of cerebral and 85% of cerebellar astrocytomas^Q.
- Majority of astrocytomas **infiltrate adjacent brain**. **Juvenile pilocytic astrocytomas** and **pleomorphic xanthoastrocytomas** are exceptions^Q.
 - Histologic features associated with higher grade include **hypercellularity, nuclear atypia, and endovascular hyperplasia**.
 - Necrosis is present only with GBMs**; it is required for the diagnosis.

39. Ans. a. Meningioma (Ref: Harrison 19/e p602)

Harrison says "meningiomas are diagnosed with increasing frequency as more people undergo neuroimaging for various indications. They are now the most common primary brain tumor, accounting for approximately 35% of total.

- MC primary brain tumor: Meningioma (35%) > gliomas (30%)**
- MC malignant brain tumor of childhood: Medulloblastoma
- MC brain tumor: Metastasis

40. Ans. d. These tumors are more common in females (Ref: Nelsons 18/e p2130, 2131)

Cerebellar astrocytomas do not show any clear gender predilection and are equally common in both males and females.

CEREBELLAR ASTROCYTOMAS

- MC astrocytomas in childhood are low grade astrocytomas**
- Juvenile Pilocytic Astrocytoma (JPA)** is MC astrocytoma in children^Q
- Cerebellar astrocytomas (JPA) **do not show any clear gender predilection**^Q
- Cerebellar astrocytomas (JPA) **most commonly develop during first two decades of life**
- Cerebellar astrocytomas have a **good prognosis**
- With **complete surgical resection** the overall survival for JPA approaches **80% - 100%**

41. Ans. b. Foramen of Monro (Ref: Neurology in Clinical Practice 4/e p428; Sutton Radiology 7/e p1735)

SUBPENDYMAL GIANT CELL ASTROCYTOMA

- Most common site of subependymal giant cell astrocytoma** is the **ependymal wall of lateral ventricle near the foramen of Monro**^Q.
- Causes **obstruction at the foramen of Monro** leading to **ventricular enlargement** and **raised ICT**.
 - Presence of **multiple periventricular calcific foci (calcified subependymal nodules)** suggest the diagnosis of **Tuberous sclerosis with subependymal giant cell astrocytoma**^Q

42. Ans. c. Astrocytoma
 44. Ans. c. Subependymal giant cell astrocytoma

43. Ans. a. Seen in elderly above 80 years

MEDULLOBLASTOMA

45. Ans. a. Radiosensitive tumor, b. Spreads through CSF, d. Occurs in young age group (Ref: Harrison 18/e p3388; Sabiston 19/e p1888; Schwartz 10/e p1734, 9/e p1540)

MEDULLOBLASTOMA

- MC malignant brain tumor of childhood: Medulloblastoma
- Turcot syndrome (A variant of FAP) is associated with increased incidence of medulloblastoma
- Highly malignant tumor found in cerebellum^Q and infratentorial location
- Occur predominantly in children^Q (peak incidence at 3-4 years^Q)
- Medulloblastoma is most radiosensitive brain tumor^Q

• MC site: Vermis (75%)

• MC site in adults: Lateral cerebellar hemisphere

Clinical Characteristics

- Child usually presents with features of increased intracranial tension^Q.
- Adults present with ataxia and unilateral dysmetria as lateral origin is more common^Q.

Metastasis

- Dissemination through CSF is common leading to drop metastasis^Q.
- Metastasis outside CNS^Q affects bone, lymph node and liver.
- Tumor dissemination is most important prognostic factor^Q.

Treatment

- Despite of extreme radiosensitivity, it should be surgically excised^Q.
- Surgical excision should be followed by radiotherapy and chemotherapy^Q.

• (Carmustine BCNU) and vincristine are primarily used for recurrences, in poor-risk patients, and in children <3 years to avoid radiation therapy^Q.

Prognosis

- Patients without a residual tumor and negative CSF seeding have 5-year survival rate >75%.

46. Ans. b. Medulloblastoma

47. Ans. c. Neurocognitive effect (Ref: www.ncbi.nlm.nih.gov/pubmed/9121399)

CRANIOSPINAL IRRADIATION (CSI)

- Hypothyroidism: One of the earliest late side effects of CSI and 2nd MC (after GH disturbance^Q)
- Prevalence of hypothyroidism is 40–80% after CSI^Q
- Significantly increased risk of development of benign thyroid nodules and papillary carcinoma of the thyroid many years later^Q.

48. Ans. b. Cerebellum

49. Ans. a. Highly radiosensitive

MENINGIOMA

50. Ans. d. Meningioma (Ref: Harrison 18/e p3388; Chapman 4/e p 431; Sabiston 19/e p1888-1889; Schwartz 10/e p1735, 1738, 9/e p1540-1541; Bailey 26/e p614, 25/e p633)

MENINGIOMA

- MC primary brain tumor: Meningioma (35%) > Glial tumors (30%)
- Meningiomas are the MC intracranial, extra-axial dural-based neoplasm^Q.
- Predominantly benign tumors of adults^Q, more common in women^Q.
- Common in patients with past history of cranial irradiation

- Derived from meningothelial cells of arachnoid^Q
- Mostly occur along the superior sagittal sinus^Q
- Most are slow growing and encapsulated^Q

Pathology:

- Round encapsulated mass showing characteristic en plaque pattern of growth^Q
- Tumor may range from firm to fibrous to finely gritty and may show extreme calcification and psammoma bodies^Q

Clinical Presentation:

- **Motor deficit** in 90% (spasticity and lower limb weakness), **sensory deficit** in 60% or **sphincter dysfunction** of bladder^Q.

Radiological Findings in Meningioma

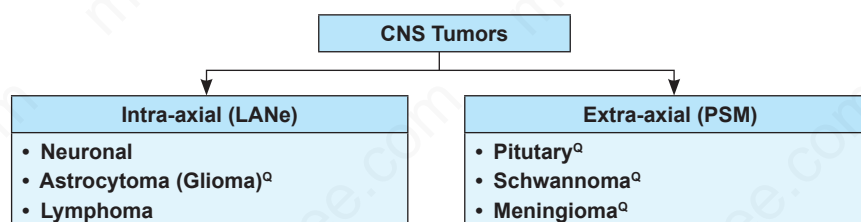
- | | |
|---|--|
| <ul style="list-style-type: none"> • Nearly all meningiomas enhance intensely^Q following contrast administration. • Abnormal vascular markings^Q • Enlarged foramen spinosum^Q on the side of lesion • Dural tail • Calcification in the tumor^Q | <ul style="list-style-type: none"> • Invasion of bone cause localized bony hyperostosis/mixed osteoblastic and osteolytic response less commonly. It may show 'sun ray spicules' and local bone expansion with pneumatization so called 'blistering' • Signs of increased intracranial tension^Q |
|---|--|

Treatment:

- Surgery is the **treatment of choice** for symptomatic meningiomas.
- **Extent of resection** is the **most important factor** in the prevention of recurrence.
- **Recurrence** after gross total resection occurs in **11-15%** of cases.

51. Ans. a. Calcification, d. Osteosclerosis, e. Vascular erosion

52. Ans. b. Meningioma



53. Ans. c. Meningioma

- Meningioma is slow growing and encapsulated tumor having best prognosis among the given options.

54. Ans. a. Meningioma

55. Ans. a. Stop steroids

- **Sudden withdrawal of steroids** may lead to **adrenal insufficiency**, particularly during period of stress such as surgery.

56. Ans. a. Hepatocellular carcinoma

CRANIOPHARYNGIOMA

57. Ans. d. Craniopharyngioma (Ref: Harrison 18/e p3389; Schwartz 10/e p1736-1737, 9/e p1542)

CRANIOPHARYNGIOMA

- Craniopharyngiomas are **benign cystic lesions** that occur **most frequently** in **children**^Q.
- There is a **second peak** of incidence around **50 years** of age.
- Derived from **Rathke's pouch**^Q and arise near the pituitary stalk, commonly extending into the suprasellar cistern.

- Craniopharyngiomas are often **large, cystic, and locally invasive**^Q.

Clinical Features

- **More than half** of all patients present **before 20 years**^Q
- Presents with signs of **increased intracranial pressure**^Q, including headache, vomiting, papilledema, and hydrocephalus.
- Associated symptoms include **visual field abnormalities**^Q, personality changes and cognitive deterioration, cranial nerve damage, sleep difficulties, and weight gain.

- Associated with **hypopituitarism** (90%) and **diabetes insipidus** (10%) and **growth retardation** (50%)^Q

Diagnosis

- **Calcification** occurs in **all pediatric** and roughly **half** of **adult** craniopharyngiomas^Q.
- **MRI** is superior to CT for **evaluating cystic structure** and **tissue components** of craniopharyngiomas^Q.
- **CT** is useful to define **calcifications** and evaluate **invasion** into surrounding **bony structures** and **sinuses**.

Treatment

- Treatment involves transcranial or **transsphenoidal^Q** surgical resection followed by **postoperative radiation** of residual tumor.
 - Surgery alone is curative in less than half** of patients because of **recurrences** due to **adherence to vital structures** or because of **small tumor deposits in hypothalamus or brain parenchyma^Q**.
 - In the **absence of radiotherapy**, about **75% of craniopharyngiomas recur**, and 10-year survival is **<50%^Q**.
- In patients with **incomplete resection**, **radiotherapy improves 10-year survival** to 70–90% but is associated with **increased risk of secondary malignancies^Q**.
- Most patients require **lifelong pituitary hormone replacement^Q**.
 - Cortisol (hydrocortisone) is the first hormone to be replaced^Q** in patients with **panhypopituitarism after craniopharyngioma surgery**.

58. Ans. b. Craniopharyngioma

59. Ans. a. Hydrocortisone

60. Ans. b. Craniopharyngioma

61. Ans. c. Present in sella or infra-sellar location

PITUITARY ADENOMA

62. Ans. a. Accounts for 10% of brain tumors, b. Erodes the sellar and extends into surrounding area, d. It is differentiated by reticulin stain (Ref: Harrison 18/e p2880; Sabiston 19/e p1890; Schwartz 10/e p1735, 9/e p1541; Bailey 26/e p614-616, 25/e p633)

PITUITARY ADENOMA

- Pituitary adenomas arise primarily from the **anterior pituitary gland^Q**
- MC cause of hyperpituitarism: Pituitary adenoma^Q**
- Classified as either **functional** (secreting) or **nonfunctional** (nonsecreting) tumors
- Former presenting **earlier with symptoms** caused by **physiologic effects** and the latter presenting when of **sufficient size** to cause **neurologic deficits by mass effect on the chiasm** with consequent **bitemporal hemianopsia^Q**.
- Incidence is increased in **MEN-1^Q**
 - Pituitary adenoma can be differentiated from hyperplasia by reticulin stain^Q**
 - Absence of reticulin stain in pituitary adenoma^Q**

Clinical Features

- Occur commonly in the **third and fourth decades** and affect **both sexes equally^Q**.
- MC functional tumor is prolactinoma^Q**, which causes **amenorrhea** and **galactorrhea** in women^Q.

Diagnosis

- MRI is IOC for pituitary tumors^Q**
- Typically, the **pituitary gland enhances rapidly** owing to lack of blood-brain barrier.
- Microadenoma** may appear as a **nonenhancing area within the gland**.
- Diagnostic workup includes a **full endocrinologic profile** and a **formal visual fields test^Q**.

Treatment

- Dopamine agonist, bromocriptine^Q**, can **shrink prolactinomas** in 75% of patients with **macroadenomas** in **6-8 weeks**, but only as long as therapy is maintained.
- Bromocriptine may also work on **GH-secreting tumors** with tumor **shrinkage** in **<20%**.
- Octreotide^Q** can **reduce GH levels** in 71% of patients, with a **significant reduction** in tumor **volume** in 30% of cases.

Indications of Surgery as an initial treatment

- | | |
|---|--|
| <ul style="list-style-type: none"> GH-secreting tumors^Q Primary Cushing's disease^Q Any adenoma causing acute visual deterioration^Q | <ul style="list-style-type: none"> Nonprolactin-secreting macroadenomas causing symptoms by mass effect^Q |
|---|--|

- Surgical approach** of choice: **Sublabial or intranasal trans-sphenoidal^Q** approach
- Recurrence rate: 12%** (most recurrences occur 4-8 years after surgery)
- Radiosurgery** can also be used either as **primary therapy**, as an **adjuvant therapy** after subtotal resection, or **for recurrent disease**.
- The **main dose-limiting structure** is proximity to the **optic chiasm and optic nerves** (within 3-5 mm). In this case, **fractionated EBRT** may be indicated as an adjuvant therapy

- MC suprasellar mass in children: Craniopharyngioma^Q**
- MC suprasellar mass in adults: Pituitary adenoma^Q**

CUSHING DISEASE

- Pituitary dependent cause of Cushing syndrome (pituitary adenoma secreting excessive ACTH)

63. Ans. c. Transphenoidal 64. Ans. d. Prolactin secreting pituitary microadenoma
65. Ans. a. Pituitary adenoma 66. Ans. a. Pituitary adenoma

SPINAL TUMORS

67. Ans. d. Metastasis (Ref: Scott Atlas, MRI of the Brain and Spine 3rd/1742; Sabiston 19/e p1890; Schwartz 10/e p1737-1739, 9/e p1543-1544)

SPINAL TUMORS

- MC spinal tumor: Metastasis^Q
- MC primary spinal tumor: Nerve sheath tumor^Q
- MC intramedullary tumor: Astrocytoma^Q
- MC site of primary spinal tumor: Intradural extramedullary^Q

68. Ans. c. Neurofibroma
69. Ans. c. Extradural

CNS LYMPHOMA

70. Ans. a. Reticulin staining done, b. Essentially B-cell type, c. Associated with EBV (Ref: Harrison 18/e p3387-3388; Sabiston 19/e p1888; Schwartz 10/e p1736, 9/e p1542; Bailey 25/e p630)

PRIMARY CNS LYMPHOMA

- PCNSL is a rare **non-Hodgkin's lymphoma**^Q accounting for <3% of primary brain tumors.
- The **incidence** is **rising** due to the **high frequency** of CNS lymphoma in **AIDS** patients and **transplant recipients**^Q.

- PCNSL in **immunocompetent** patients usually consists of **diffuse large B-cell lymphomas**^Q.
- PCNSL in **immunocompromised** patients is typically **large cell** with **immunoblastic** and more **aggressive features**^Q.
- Also known as **ghost-cell tumor** because of its tendency for **partial to complete resolution on CT** after the administration of **steroids**^Q.

- **Epstein-Barr virus** frequently plays an **important role** in the pathogenesis of **HIV-related PCNSL**^Q.
- A **stereotactic needle biopsy** is indicated when the index of suspicion for CNS lymphoma is high because these lesions are **highly sensitive to radiation**^Q.

Clinical Features

- PCNSL usually presents as a **mass lesion**, with **neuropsychiatric symptoms**, symptoms of **increased intracranial pressure**, lateralizing signs, or **seizures**^Q.
- Median age at diagnosis: **52 years** (younger in the immunocompromised).

Diagnosis

- On **contrast-enhanced MRI**: **Densely enhancing tumor**^Q
- **Immunocompetent** patients have **solitary lesions** more often than immunosuppressed patients.
- Frequent **involvement** of the **basal ganglia**, **corpus callosum**, or **periventricular region**^Q.
- **Stereotactic biopsy** is necessary for **histologic diagnosis**^Q.

- **Glucocorticoids** should be **withheld** before **biopsy** due to **cytolytic effect** on **lymphoma cells** leading to nondiagnostic tissue (**Ghost cell tumor**)^Q

Treatment

- PCNSL is relatively sensitive to glucocorticoids, chemotherapy and radiotherapy.
- **High-dose methotrexate**^Q produces **response rates** of **35-80%** and median survival up to 50 months.
- Combination of **methotrexate** with other chemotherapeutic agents such as **cytarabine**, as well as **whole-brain radiotherapy**, increases the **response rate** to **70-100%**^Q.

- In **non-AIDS cases**, **chemotherapy + EBRT** prolongs survival compared with EBRT alone.
- **AIDS patients** are treated with **whole-brain radiotherapy**, **high-dose methotrexate**, and initiation of **highly active antiretroviral therapy**^Q.

Prognosis

- Without therapy, median survival time is 1.8–3.3 months.
- With radiation, median survival time is 10 months.
- In AIDS-related cases, the median survival time is only 3–5 months.

71. Ans. a. Radiotherapy and chemotherapy is of no value

SCHWANNOMA AND NEUROFIBROMA

72. Ans. b. Neurofibroma

- The term “dumbbell” lesion is used to describe neurofibroma.

73. Ans. a. Superior vestibular nerve (Ref: Harrison 18/e p3388–3389; Sabiston 19/e p1889; Schwartz 9/e p1541; Bailey 26/e p616, 25/e p700)

ACOUSTIC NEUROMA

- Acoustic neuroma is a **benign, encapsulated**, extremely **slow growing** tumor of 8th nerve.
- MC site of origin: **Inferior vestibular > superior vestibular nerve**
- Age group of 40–60 years. (M:F=1:1)

Clinical features

- Presenting symptom: **Progressive unilateral sensorineural hearing loss^Q** accompanied by **tinnitus**
- Cochleo-vestibular symptoms are the **earliest symptoms^Q**.

Cranial nerve involvement		
V	VII	IX and X
<ul style="list-style-type: none"> • Reduced corneal sensitivity and numbness of face^Q 	<ul style="list-style-type: none"> • Hypoesthesia of posterior meatal wall^Q • Loss of taste^Q • Decreased lacrimation^Q 	<ul style="list-style-type: none"> • Dysphagia/hoarseness^Q

- Brainstem involvement, Cerebellar involvement, Raised intracranial tension

Diagnosis

- MRI with gadolinium contrast is the **gold standard** for diagnosis of acoustic neuroma^Q.

- Acoustic neuroma can arise from any nerve except Optic and Olfactory because they are myelinated by oligodendroglia rather than Schwann cells^Q.

MISCELLANEOUS

74. Ans. a. Glioma

75. Ans. d. Neuroblastoma

76. Ans. a. Frontal lobe tumours

77. Ans. c. Skull bone tumors (Ref: Bailey 25/e p133–135)

MAGNETIC RESONANCE IMAGING

- MRI was discovered by Lauterbur^Q in 1973.
- MRI is **best for soft tissues^Q**.

78. Ans. d. Ependymoma (Ref: Robbins 8/e p1330, 1335)

- Ependymomas are **glial tumors**, derived from the **ependymal cells** that line the ventricular surface. These tumors **do not originate from neurons^Q**.

79. Ans. a. Schwannoma (Ref: Osborn Radiology/501)

- Schwannoma is **hypointense** on T1 and **hyperintense** on T2.

80. Ans. a. PET scan

81. Ans. c. Medulloblastoma

82. Ans. c. Gd enhanced MRI

83. Ans. d. Popcorn like lesion (Ref: Osborn Neuroradiology/313)

MRI appearance of cavernous angioma is highly characteristic, showing “popcorn like lesion”^Q.

84. Ans. d. Neuropsychological sequelae are independent of radiation dose (Ref: *Tumors of Pediatric CNS (Thieme) 2001/141*)

- Total radiation dose is the strongest factor determining the magnitude of white matter changes as well as neuropsychological effects^Q.

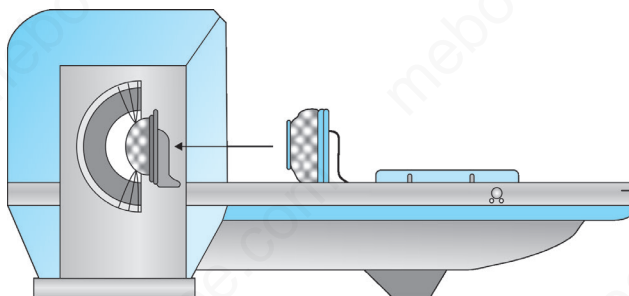
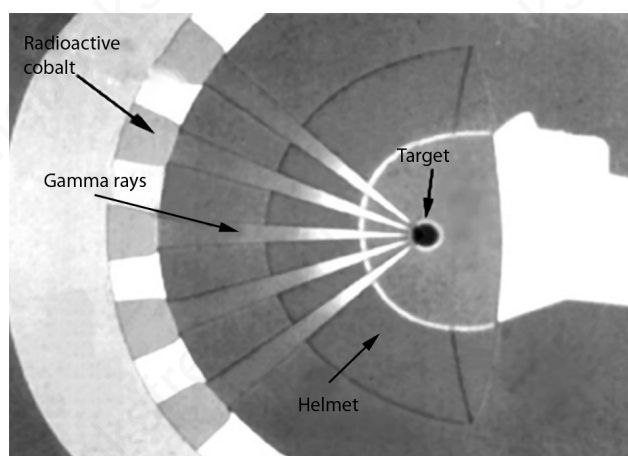
85. Ans. a. Nelson syndrome

NELSON SYNDROME

- Nelson syndrome refers to a spectrum of symptoms and signs arising from an **adrenocorticotropin (ACTH)–secreting pituitary macroadenoma after a therapeutic bilateral adrenalectomy**.
- The spectrum of clinical features observed relates to the **local effects of the tumor on surrounding structures**, the **secondary loss of other pituitary hormones**, and the **effects of the high serum concentrations of ACTH on the skin**.

86. Ans. a. Brain tumor (Ref: *Sabiston 19/e p1900-1902; Schwartz 10/e p1749, 9/e p1552-1553*)

Stereotactic surgery is used for treatment of brain tumors



STEREOTACTIC RADIOSURGERY

- Stereotactic radiosurgery involves the delivery of a **concentrated dose of radiation to a defined volume in the brain**^Q.

Two methods of frame-based stereotactic radiosurgery are currently widely used.

- **Gamma knife** uses **cobalt-201^Q** radiation sources focused on one point.
- **Modified linear accelerators^Q** deliver the radiation dose in multiple arcs, thereby minimizing the effect on surrounding brain tissue.
- **Primary risks** of stereotactic radiosurgery are **radiation necrosis** and **radiation injury** to surrounding structures.

Common uses of Stereotactic Radiosurgery

- | | |
|--|--|
| • Metastatic tumors | • Arteriovenous malformations ^Q |
| • Benign lesions of the cranial nerves | • Trigeminal neuralgia |

87. Ans. c. Hemangioblastoma (Ref: *Harrison 18/e p793; Sabiston 19/e p1888; Schwartz 10/e p1735-1736, 9/e p1541*)

- Highly vascular tumor of brain and spinal cord in adults Hemangioblastoma.

SECTION 8

HEAD AND NECK

CHAPTERS

- ❖ Oral Cavity
- ❖ Salivary Glands
- ❖ Neck
- ❖ Facial Injuries and Abnormalities

Oral Cavity

MULTIPLE CHOICE QUESTIONS

CARCINOMA ORAL CAVITY PREDISPOSING FACTORS

- Regarding premalignant oral lesions: (COMEDK 2005)
 - Leukoplakia should be proved by biopsy
 - Leukoplakia does not disappear after cessation of smoking
 - Erythroplakia has a higher risk for malignancy
 - Oral submucous fibrosis is seen in all parts of the world
- The most strongly implicated premalignant condition of the oral cavity is: (COMEDK 2010)
 - Fordyce spots
 - Erythroplakia
 - Median rhomboid glossitis
 - Erythema multiforme
- Treatment of leukoplakia: (JIPMER 2011)
 - Local excision
 - Excision and radiotherapy
 - Topical chemotherapy
 - Repositioning of ill fitting dentures
- Risk factor for oropharyngeal carcinoma: (PGI May 2011)
 - Sideropenic dysphagia
 - Oral submucous fibrosis
 - Erythroplakia
 - Leukoplakia
 - Chronic hypertrophic candidiasis
- Treatment of Erythroplakia? (MHSSMCET 2007)
 - Excision
 - Stoppage of alcohol and tobacco
 - Vitamin supplementation
 - Laser ablation
- All of the following predisposes to oral cancer, except: (Orissa 2011, PGI Dec 99)
 - Erythroplakia
 - Leukoplakia
 - Submucosal fibrosis
 - Lichen planus
- Saroj, a 32-years old female, from rural background presented with a history of chronic tobacco chewing since 14 year of age. Now she has difficulty in opening her mouth. On oral examination, no ulcers are seen. Most probable diagnosis is: (AIIMS June 2001)
 - Submucous oral fibrosis
 - Carcinoma of buccal mucosa
 - TM joint arthritis
 - Trigeminal nerve paralysis
- Virus causing head and neck cancer: (PGI Nov 2011)
 - EBV
 - HSV
 - HPV
 - HBV
 - HCV
- All of the following predispose to squamous cell carcinoma, except: (AIIMS June 93)
 - Lichen planus of mouth
 - Bowen's disease
 - Inverted papilloma of nose
 - Chronic irritation of oral mucosa by jagged teeth
- The pre-malignant condition with the highest probability of progression to malignancy is: (Bihar PG 2014, All India 2002)
 - Dysplasia
 - Hyperplasia
 - Leukoplakia
 - Erythroplakia
- The commonest pre-malignant condition of oral cancer is: (All India 95)
 - Leukoplakia
 - Aphthous ulcer
 - Lichen planus
 - Erythro-leukoplakia
- Predisposing factors for development of oral carcinoma is:
 - Smoking
 - Alcohol (JIPMER 88)
 - Syphilis
 - All of the above
- Not a carcinogenic for cancer of Head and Neck: (PGI 96)
 - Alcohol
 - Smoking
 - Tobacco
 - Unflourinated water
- A 70-years old male presented with asymptomatic white patch on oral cavity following application of the denture. Treatment of choice is: (UPPG 2008)
 - Low dose radiotherapy
 - Biopsy of the all the tissues
 - Ascertaining that denture is fitted properly
 - Antibiotics

CARCINOMA ORAL CAVITY

- Second primary tumor of head and neck is most commonly seen in malignancy of: (AIIMS May 2012)
 - Oral cavity
 - Larynx
 - Hypopharynx
 - Paranasal sinuses
- The commonest site of oral cancer among Indian population is: (Kerala PG 2015, All India 2004)
 - Tongue
 - Floor of mouth
 - Alveobuccal complex
 - Lip

17. **Most common site of oral cavity carcinoma is:** (All India 96)
 a. Lip b. Cheek
 c. Tongue d. Palate
18. **Areas of carcinoma of oral mucosa can be identified by staining with:** (PGI 79, BHU 85)
 a. 1% zinc chloride b. 2% silver nitrate
 c. Gentian violet d. 2% toluidine blue
19. **SCC in the oral cavity and lips tend to metastasize to lymph nodes at which levels:** (MHCET 2016)
 a. I, II, III b. I, II, VI
 c. III, IV, V d. I, II, retropharyngeal nodes

CARCINOMA LIP

20. **Abbe-Estlander flap is used for:** (All India 2008)
 a. Lip b. Tongue
 c. Eyelid d. Ears
21. **Abbey Estlander flap is based on:** (AIIMS May 2008)
 a. Lingual artery b. Facial artery
 c. Labial artery d. Internal maxillary artery
22. **Carcinoma of lip is characterized by the following except that:** (UPSC 2007)
 a. 90% of the lip cancers occurs on the lower lip
 b. The most common site of origin is the vermillion border
 c. 2 cm x 2 cm cell carcinomas can be treated by V shaped excision and primary closure
 d. Since lymph node metastases are common after a radical dissection of neck is mandatory
23. **Stain used to diagnose premalignant lesions of lip is:** (DNB 2011, 2006)
 a. Crystal violet b. H and E
 c. Toluidine blue d. Giemsa
24. **Treatment of choice for carcinoma of lip of less than 1 cm is:** (Kerala 87, All India 90)
 a. Radiation
 b. Chemotherapy
 c. Excision
 d. Radiation and Chemotherapy

CARCINOMA BUCCAL MUCOSA AND CHEEK

25. **True statement (s) about oral cancer is/are:** (PGI June 2004)
 a. Most common in buccal mucosa
 b. Metastasis uncommon
 c. Respond to radiotherapy
 d. Surgery done
 e. Syphilis and dental irritation predisposes
26. **Metastasis of CA buccal mucosa goes to:** (AIIMS Nov 96, All India 97)
 a. Regional lymph node b. Liver
 c. Heart d. Brain
27. **In carcinoma cheek, what is the best drug for single drug chemotherapy?** (AIIMS June 93)
 a. Vincristine b. Cyclophosphamide
 c. Cisplatin d. Daunorubicin
28. **An old man who is edentulous developed squamous cell carcinoma in buccal mucosa that has infiltrated to the alveolus. Following is not indicated in treatment:** (All India 2002)
 a. Radiotherapy
 b. Segmental mandibulectomy
 c. Marginal mandibulectomy involving removal of the outer table only
 d. Marginal mandibulectomy involving removal of upper half of mandible

29. **A patient with cheek cancer has a tumour of 2.5 cm located close to and involving the lower alveolus. A single mobile ipsilateral lymph node measuring 6 cm is palpable. The TNM stage is:** (NEET 2013, COMEDK 2008)
 a. T1N1M0 b. T2N2M0
 c. T2N1M0 d. T4N2M0
30. **In the reconstruction following excision of previously irradiated cheek cancer, the flap will be:** (DNB 2013, AIIMS 85)
 a. Local tongue
 b. Cervical
 c. Forehead
 d. Pectoralis major myocutaneous

CARCINOMA PALATE

31. **All are true about carcinoma palate, except:** (AIIMS June 94, Nov 93)
 a. Slow growing b. Bilateral lymphatic spread
 c. Adenocarcinoma d. Presents with pain

CARCINOMA TONGUE

32. **A patient has carcinoma of tongue in the right lateral aspect with lymph node of 4 cm size in level 3 on the left side of neck, what is the stage?** (AIIMS Nov 2006)
 a. N0 b. N1
 c. N2 d. N3
33. **A patient presented with a 1 X 1.5 cms growth on the lateral border of the tongue. The treatment indicated would be:** (Recent Question 2014, AIIMS June 2002)
 a. Laser ablation
 b. Interstitial brachytherapy
 c. External beam radiotherapy
 d. Chemotherapy
34. **A patient with CA tongue is found to have lymph nodes in the lower neck. The treatment of choice for the lymph nodes is:** (All India 2005)
 a. Lower cervical neck dissection
 b. Suprahyoid neck dissection
 c. Tele radiotherapy
 d. Radical neck dissection
35. **Carcinoma of tongue most commonly occur at:** (MCI March 2009)
 a. Dorsum
 b. Lateral border of anterior 2/3rd
 c. Lateral border of posterior 1/3rd
 d. Tip
36. **Most common histological type of carcinoma of base of tongue:** (MCI March 2007)
 a. Squamous cell carcinoma b. Adenocarcinoma
 c. Basal cell carcinoma d. Transitional cell carcinoma
37. **Tongue ulcer with everted edges is:** (MHPGMCET 2005, 2001)
 a. Aphthous ulcer b. Tubercular
 c. Malignant d. Dental
38. **Commonest site of carcinoma tongue is:** (TN 89)
 a. Dorsum b. Ventral aspects
 c. Anterior 2/3rd lateral aspect d. Tip
39. **Carcinoma tongue less than 2 cm is treated by:** (JIPMER 87)
 a. Excision b. Radiotherapy
 c. Chemotherapy d. Excision and Radiotherapy
 e. Excision and Chemotherapy

40. A 60-years old man presents with an ulcer on lateral margin of tongue also complains of ear pain, most probable diagnosis is: (PGI 96)

a. Dental ulcer b. Carcinomatous ulcer
c. Tuberculosis ulcer d. Syphilitic ulcer

41. Carcinoma of the tongue: (JIPMER 81, UPSC 85)

a. Occurs most commonly on the lateral border of the middle third of tongue
b. Metastasize readily to cervical lymph nodes
c. Is usually radiosensitive
d. Treated surgically should include homolateral neck dissection except for very small lesion
e. All of the above

42. Which is not true of carcinoma tongue?

a. Lateral border is involved (DPG 2010, AIIMS 92)
b. Cervical lymph node involvement
c. Commonly adenocarcinoma
d. Tobacco chewing is a risk factor

43. The commando operation is: (JIPMER 80, 81)

a. Abdomino-perineal resection of the rectum for carcinoma
b. Disarticulation of the hip for gas gangrene of the leg
c. Extended radical mastectomy
d. Excision of carcinoma of the jaw and lymph nodes enbloc

44. Commando's operation is for: (Recent Questions 2013)

a. Mandible b. Radical mastectomy
c. Leg amputation d. Oral cancer

45. Carcinoma tongue is most common at: (Recent Questions 2013)

a. Lateral border b. Dorsum
c. Posterior 1/3rd d. Tip of tongue

CARCINOMA MAXILLA

46. Treatment for stage T3N1 of carcinoma maxilla is:

a. Radiation therapy only (DNB 2012, AIIMS June 94)
b. Chemotherapy only
c. Surgery and radiation
d. Chemotherapy and radiation

47. The lymph not to be involved first in maxillary carcinoma:

a. Superior deep cervical nodes (DNB 2007)
b. Jugulodiagastric nodes
c. Submandibular
d. Subdiagastric nodes

MANDIBLE AND MANDIBULECTOMY

48. A 80-years old patient presents with a midline tumor of the lower jaw, involving the alveolar margin. He is endentulous. Treatment of choice is: (All India 2001)

a. Hemimandibulectomy
b. Commando operation
c. Segmental mandibulectomy
d. Marginal mandibulectomy

TRISMUS

49. Trismus in oral cancer patients is severe in those treated with: (Karnataka 99)

a. Surgery and Radiotherapy
b. Chemotherapy alone
c. Surgery alone
d. Not related to treatment

CANCERUM ORIS

50. All are true about cancrum oris except: (PGI Dec 97)

a. Associated with malnutrition and vitamin deficiency
b. Follows chronic infection
c. Involves jaw
d. Treatment is excision and skin grafting with tubed pedicle graft

LUDWIG'S ANGINA

51. Which of the following statements best represent Ludwig's angina? (AIIMS May 2005)

a. A type of coronary artery spasm
b. An infection of the cellular tissues around submandibular salivary gland
c. Esophageal spasm
d. Retropharyngeal infection

DENTAL CYST AND ABNORMALITIES

52. The most frequent tooth to be impacted is:

(UPSC 2007, Karnataka 98)

a. Lower third molar b. Lower canine
c. Upper third molar d. Upper premolar

53. Impacted wisdom teeth may produce referred pain via:

a. Lingual nerve (Orissa 99)
b. Facial nerve
c. Branch of the auriculotemporal nerve
d. None of the above

54. Radiographic finding of floating teeth can be seen in:

(Karnataka 2002)

a. Ectodermal dysplasia
b. Cleidocranial dysplasia
c. Osteopetrosis
d. Histiocytosis-X

55. The most common cyst of the oral region is: (DPG 2008)

a. Dentigerous cyst b. Keratosis cyst
c. Dermoid cyst d. Periapical cyst

56. Dentigerous cyst arises from:

(DPG 2009 Feb, MHPGMCET 2003)

a. The root of a caries tooth
b. The periosteum of the fractured mandible
c. An unerupted permanent tooth
d. The sequestrum of osteomyelitis of mandible

57. Which jaw cyst is premalignant? (AIIMS May 2012)

a. Nasopalatine cyst b. Radicular cyst
c. Odontogenic keratocyst d. Dentigerous cyst

58. What are Rushton bodies? (DNB 2012)

a. Hyaline bodies of odontogenic cyst
b. Refractile bodies of radicular cyst
c. Bodies seen in ameloblastoma
d. Hyaline bodies seen in dentigerous cyst

MISCELLANEOUS

59. Asymptomatic hemangioma on ventral surface of the tongue in a 10 years old boy is treated by:

a. Watchful expectancy b. Surgical Excision
c. Radiotherapy d. Laser

60. Pharyngocutaneous fistula is seen in all except:

a. Chemotherapy b. Surgery (AIIMS June 99)
c. No wound care d. Radiotherapy

61. Gum tumour with 2 contralateral mobile lymph nodes in neck come under: (PGI Dec 99)

- | | |
|-----------------|-----------------|
| a. $T_3 N_2 M0$ | b. $T_2 N_2 M0$ |
| c. $T_4 N_2 M0$ | d. $T_3 N_3 M0$ |

62. Epulis arises from: (NEET 2013, PGI Dec 99)

- | | |
|------------|------------------|
| a. Enamel | b. Root of teeth |
| c. Gingiva | d. Pulp |

63. Epulis is? (DNB 2014)

- Benign
- Malignant
- Reactive process
- Precancerous

64. A patient has small, oval multiple ulcers in oral cavity with red erythematous margins. The diagnosis is: (AIIMS Nov 93)

- | | |
|---------------------|---------------------|
| a. Carcinoma | b. Aphthous ulcer |
| c. Tubercular ulcer | d. Syphilitic ulcer |

65. Multiple painful ulcers on tongue are seen in all except:

(All India 96)

- | | |
|-------------------|-------------------------|
| a. Aphthous ulcer | b. Tuberculous ulcers |
| c. Herpes ulcers | d. Carcinomatous ulcers |

66. Painless ulcer of the tongue is due to: (PGI 79, 80, UPSC 87)

- | | |
|-----------------|----------------------|
| a. Dyspepsia | b. Syphilis |
| c. Tuberculosis | d. None of the above |

67. Reparative granuloma of jaw is treated by: (DPG 2009 Feb)

- Antibiotics
- Wedge resection
- Resection and bone grafting
- Curettage

68. Treatment of T4N0M0 stage of head and neck carcinoma is:

(DNB 2009)

- | | |
|-------------------|-----------------------------|
| a. Surgery alone | b. Radiotherapy alone |
| c. Chemoradiation | d. Surgery and radiotherapy |

EXPLANATIONS

CARCINOMA ORAL CAVITY PREDISPOSING FACTORS

1. Ans. c. Erythroplakia has a higher risk for malignancy (Ref: Bailey 26/e p707-708, 25/e p735-737; Devita 9/e p564; Cancer of the Head and Neck by Suen and Myer 4/e p284-285)
- Oral submucous fibrosis is almost entirely confined to the Asian population and is characterized pathologically by epithelial fibrosis with associated atrophy and hyperplasia of the overlying epithelium.

Leukoplakia	Erythroplakia
<ul style="list-style-type: none"> • White keratotic plaque or patch that cannot be rubbed off^Q and cannot be given another diagnostic name • Risk factors: Smoking, alcohol, ill-fitting dentures, jagged tooth^Q • Key pathologic features: Hyperkeratosis, parakeratosis, acanthosis^Q • In most cases, lesions regress spontaneously after stopping alcohol or tobacco consumption or correction of underlying cause^Q. • Baseline biopsy should be done^Q • Lesions with moderate to severe dysplasia should be excised^Q. • Oral leukoplakia has low potential for malignancy^Q. 	<ul style="list-style-type: none"> • Red mucosal plaque, most commonly found on the soft palate and tonsillar pillars^Q • Does not arise from an obvious mechanical or inflammatory cause • Cannot be ascribed to another clinical or pathological condition • Key pathologic features: severe cellular dysplasia^Q • Because of increased malignant potential, all erythroplakic lesions must be biopsied^Q. • Higher risk (17 times) of malignant transformation than leukoplakia^Q.

2. Ans. b. Erythroplakia

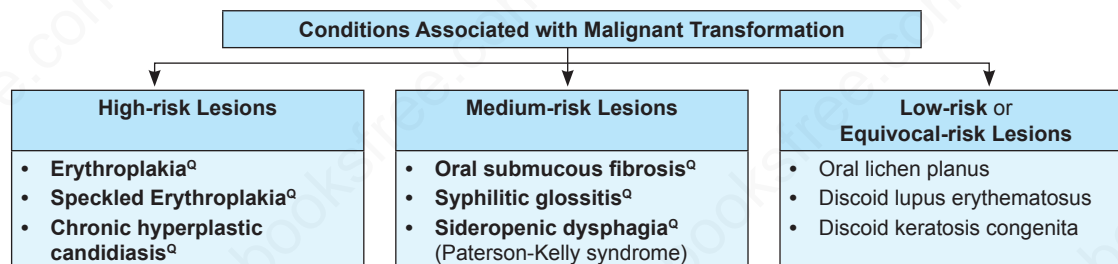
3. Ans. d. Repositioning of ill fitting dentures

LEUKOPLAKIA

- In **most cases**, lesions **regress spontaneously** after stopping alcohol or tobacco consumption or **correction of underlying cause**^Q.

4. Ans. a. Sideropenic dysphagia, b. Oral submucous fibrosis, c. Erythroplakia, d. Leukoplakia, e. Chronic hypertrophic candidiasis (Ref: Bailey 26/e p708-709, 25/e p734; Devita 9/e p729; Cancer of the Head and Neck by Suen and Myer 4/e p281-283)

Risk Factors for Cancer of Oral Cavity		
<ul style="list-style-type: none"> • Tobacco^Q • Alcohol^Q • Areca nut/pan masala^Q • Sharp or jagged tooth^Q 	<ul style="list-style-type: none"> • Ill-fitting dentures^Q • Syphilitic glossitis^Q • Human papilloma virus^Q 	<ul style="list-style-type: none"> • Epstein-Barr virus^Q • Plummer-Vinson syndrome^Q • Poor nutrition



5. Ans. a. Excision

6. Ans. d. Lichen planus

7. Ans. a. Submucous oral fibrosis (Ref: Bailey 26/e p708, 25/e p737; Devita 9/e p729)

ORAL SUBMUCOUS FIBROSIS

- Oral submucous fibrosis is a **progressive disease** in which **fibrous bands form beneath the oral mucosa**^Q.
- Almost **entirely confined to the Asian population**^Q
- **Risk factor for oral cavity malignancies** (squamous cell carcinoma^Q)

Risk Factors

- Research strongly indicates that oral submucous fibrosis is **significantly associated** with the use of **pan masala areca nut**, with or without concurrent alcohol use^Q.
- Tobacco smoking alone is **not associated** with oral submucous fibrosis.

Pathology

- Characterised by **epithelial fibrosis** with associated **atrophy** and **hyperplasia** of the overlying **epithelium**^Q.
- Epithelium** shows changes of **epithelial dysplasia**^Q.

Clinical Features

- Scarring produces **contracture**, resulting in **limited mouth opening** and **restricted tongue movement**^Q.

Treatment

- Restricted mouth opening** can be treated with either **intralesional steroids** or **surgical excision** and **skin grafts**^Q.

8. Ans. a. EBV, c. HPV 9. Ans. a. Lichen planus of mouth 10. Ans. d. Erythroplakia
11. Ans. a. Leukoplakia 12. Ans. d. All of the above 13. Ans. d. Unflourinated water
14. Ans. c. Ascertaining that denture is fitted properly

CARCINOMA ORAL CAVITY

15. Ans. a. Oral cavity (Ref: *Second primary malignancies in patients with head and neck cancers by Sandeep Samant, Head and Neck 2005; 27; 1042*)
- "The site of index cancer influences the most likely site of a second primary malignancy, as an example, in a series of 1257 patients with SCC of the head and neck, patients with an index malignancy arising in the **larynx** were more like to develop a **second primary cancer in the lung**, while those arising in the **oral cavity** were more likely to develop a **second primary in the head and neck or esophagus**. This relationship has been observed in other studies as well."
 - Patients with **head and neck SCC** are at **increased risk** for the **development of second primary malignancies** compared with general population^Q.
 - These second primary malignancies **typically develop in the aerodigestive tract** (lung, head and neck, esophagus)^Q.
 - MC second primary malignancy: Lung cancer**^Q
 - Highest relative increase in risk** is for a **second head and neck cancer**^Q.
16. Ans. c. Alveobuccal complex (Ref: *Bailey 26/e p709-710, 25/e p734, 738; Devita 9/e p729; Cancer of the Head and Neck by Suen and Myer 4/e p297-304*)
- MC site of CA oral cavity: Tongue > Lip**^Q
 - MC histological type of CA oral cavity: Squamous cell carcinoma**^Q
 - MC type of cancer in India: CA oral cavity**^Q
 - MC site of CA oral cavity in India: Buccal mucosa**^Q (38%) > Anterior tongue (16%) > Lower alveolus (15.7%)
 - LN metastasis is most common in: CA tongue**^Q > Floor of mouth > Lower alveolus > Buccal mucosa > Upper alveolus > **Hard palate** > Lip^Q.
 - Bilateral lymphatic spread** is common in: **Lower lip**^Q, **supraglottis**^Q and **soft palate**^Q.
- Edge biopsy** is recommended for **diagnosis** of **oral cavity malignancies**^Q.
 - MRI: IOC** for **staging** of **head and neck malignancies**^Q.

7th AJCC TNM Classification of Carcinoma Lip and Oral Cavity

	Primary Tumor (T)		Regional Lymph Nodes (N)
Tis	Carcinoma in situ.	N1	Metastasis in a single ipsilateral LN , ≤3 cm in greatest dimension.
T1	Tumor ≤2 cm in greatest dimension.	N2a	Metastasis in single ipsilateral LN , >3 cm but ≤6 cm in greatest dimension.
T2	Tumor >2 cm but ≤4 cm in greatest dimension.	N2b	Metastases in multiple ipsilateral LN , none >6 cm in greatest dimension.
T3	Tumor >4 cm in greatest dimension.	N2c	Metastases in bilateral or contralateral LN , none >6 cm in greatest dimension.
T4a	Lip: Tumor invades through cortical bone , inferior alveolar nerve , floor of mouth , or skin of face , that is, chin or nose. Oral cavity: Tumor invades adjacent structures only (e.g., through cortical bone [mandible or maxilla] into deep muscle of tongue , maxillary sinus , or skin of face).	N3	Metastasis in a LN >6 cm in greatest dimension.
			Distant Metastasis

T4b	Tumor invades masticator space, pterygoid plates, or skull base and/or encases internal carotid artery .	M0	No distant metastasis.
		M1	Distant metastasis.

Stage Grouping						
0	I	II	III	IVA	IVB	IVC
Tis N0M0	T1 N0M0	T2 N0M0	T3 N0M0 T1-3 N1 M0	T4a N0M0 T4a N1 M0 T1-4a N2 M0	Any T N3 M0 T4b Any N M0	Any N Any T M1

17. Ans. c. Tongue

18. Ans. d. 2% toluidine blue (Ref: www.headandneckoncology.org/content/1/1/5)

TOLUIDINE BLUE

- Toluidine blue is a **basic metachromatic dye** with **high affinity** for **acidic tissue** components, thereby **staining tissues rich in DNA and RNA**.
- Wide applications** both as **vital staining in living tissues** and as a **special stain** used in vivo to **identify dysplasia and carcinoma** of the oral cavity.

19. Ans. a. I, II, III.

CARCINOMA LIP

20. Ans. a Lip: (Ref: *Bailey 26/e p712-713, 25/e p740-741; Devita 9/e p744-745; Cancer of the Head and Neck by Suen and Myer 4/e p301-302*)

CARCINOMA LIP

- MC site** of CA lip: **Vermillion of lower lip**
- Typically seen in **males of 40-70 years**
- Definite correlation between CA lip and **exposure to sunlight** (UV radiations)
- MC presentation**: **Non-healing ulcer** or growth
- LN metastasis** is **rare** and **develops late**, mainly to **submental** and **submandibular LNs**.
- Bilateral lymphatic spread** is seen in CA lower lip.

Treatment of Carcinoma Lip	
T1 and T2	<ul style="list-style-type: none"> Surgery is TOC If 1/3rd or less of lip is involved: 'V' or 'W' shaped full thickness excision with lateral margin of 5 mm + Primary closure If more than 1/3rd of lip is involved: Flap reconstruction (Abbe, Estlander's flap)
T3 and T4	Combined radiation and surgery (vermillionectomy or lip shave)

Prognosis

- CA lip has the **best prognosis** in CA oral cavity.

21. Ans. c. Labial artery (Ref: *Bailey 26/e p713, 25/e p741; Devita 9/e p744; Cancer of the Head and Neck by Suen and Myer 4/e p301-302*)

Lip Reconstruction	
Cross-lip Flaps	Circumoral Advancement Flaps
<ul style="list-style-type: none"> Lip-Switch (Abbe-Estlander) flap used to repair defects of either upper or lower lip, based on labial artery 	<ul style="list-style-type: none"> Karapandzic flap: Uses a sensate, neuromuscular flap based on labial artery. Webster-Bernard repair: Use lateral nasolabial flap with buccal advancement

22. Ans. d. Since lymph node metastases are common after a radical dissection of neck is mandatory

23. Ans. c. Toluidine blue (Ref: *Indian Journal of Dental Research 2007; vol-18; Issue 3; p103-105*)

- Toluidine blue detects efficiently and rapidly mitotic figures in sections of paraffin embedded human tissues especially in oral cavity.

24. Ans. c. Excision

CARCINOMA BUCCAL MUCOSA AND CHEEK

25. Ans. b. Metastasis uncommon, c. Respond to radiotherapy, d. Surgery done, e. Syphilis and dental irritation predisposes (Ref: *Bailey 26/e p716, 25/e p744; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p302-305*)

CARCINOMA BUCCAL MUCOSA (CHEEK)

- MC site of CA oral cavity in India: Buccal mucosa^Q
- Related to chewing a combination of tobacco mixed with betel leaves, areca nut and lime shell^Q
- Most malignant tumors are low grade SCC^Q
- Frequently appearing on background of leukoplakia
- Lymphatic spread is first to level I and II LNs^Q.

Clinical Features

- Pain is minimal, obstruction of Stenson's duct can lead to parotid enlargement.

Treatment

- T1: Excision with primary closure^Q
- T2: Surgery ± Radiotherapy^Q
- T3 and T4: Surgery + Radiotherapy or chemoradiation^Q

26. Ans. a. Regional lymph node

27. Ans. c. Cisplatin (Ref: Bailey 26/e p720, 25/e p748; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p291-292)

CHEMOTHERAPY IN CANCERS OF ORAL CAVITY, HEAD AND NECK

- Adjuvant chemotherapy has been reported to improve the rate of organ preservation with no change in overall survival^Q.
- Chemotherapy is often employed in palliative setting in patients with recurrent, unresectable or distant metastases^Q.
- Drugs used: Cisplatin^Q, Methotrexate, 5-FU, Docetaxel and Paclitaxel
 - Cisplatin is the cornerstone drug in the modern management of head and neck cancer^Q.
 - Most beneficial is concurrent chemotherapy^Q.
- The addition of concurrent chemotherapy (cisplatin) to conventional radiation significantly improved survival over radiation alone^Q.
- Concurrent chemoradiation protocols have improved locoregional control and reduce the development of distant disease^Q.

28. Ans. c. Marginal mandibulectomy involving removal of the outer table only

- Whenever SCC of oral cavity involve the mandible (or within 1 cm of mandible), mandibulectomy becomes necessary^Q.
- In marginal mandibulectomy, inner cortical surface and a portion of underlying medullary cavity is excised (not only the outer table)^Q.

29. Ans. d. T4N2M0

30. Ans. d. Pectoralis major myocutaneous (Ref: Bailey 26/e p716, 25/e p744; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p302-305)

RECONSTRUCTION OF CHEEK

- For cheek reconstruction, mucosal flaps are used.
- PMMC (pectoralis major myocutaneous) flap: Most widely used flap for head and neck reconstruction^Q.

Males	Females
• Forehead flap based on anterior branch of superficial temporal artery can be used ^Q .	• Deltopectoral flap based on perforating branch of internal mammary artery is used ^Q .

CARCINOMA PALATE

31. Ans. d. Presents with pain (Ref: Bailey 26/e p718, 25/e p746-747; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p311-313)

CANCER OF HARD PALATE

- SCC of hard palate is rare
- Minor salivary gland tumors occur in the hard palate.
- Most cancers are well differentiated and of ulcerative variety^Q

Clinical Features

- Presents as **painless mass**^Q in the **roof of the mouth**
- **Lymphatic metastasis** is **uncommon**, mainly to level I and II.

Treatment

- **Smaller tumors:** **Excision** with underlying bone.
- **Larger tumors:** **Maxillectomy**
- **Radiotherapy** is used in advanced lesions.

CARCINOMA TONGUE

32. Ans. c. N2

33. Ans. b. Interstitial brachytherapy: (Ref: Bailey 26/e p713-714, 25/e p741-743; Devita 9/e p747-749, 752-754; Cancer of the Head and Neck by Suen and Myer 4/e p297-301)

- Suen and Myer says "Radiation therapy may be **curative in early cancer** (T1 and some T2) and may **preserve maximal normal anatomy and function**. Brachytherapy allows delivery of a **large radiation boost** to the **primary tumor bed**."

CARCINOMA TONGUE

- MC site is **middle of lateral border**^Q or ventral aspect of the tongue.
- MC histological type is **squamous cell carcinoma**^Q.
- MC associated risk factors are **tobacco and alcohol**^Q.
- MC variety is **ulcerative**^Q.
- **30% patients** presents with **cervical node metastasis**^Q.

CARCINOMA ORAL TONGUE

- The intrinsic tongue musculature provide little restriction to tumour growth, thus it may enlarge considerably before producing symptoms.
- Presents as **painless mass** or **ulcer** that **fails to heal** after minor trauma^Q
- MC complaint: **Mid-irritation of tongue**^Q.
- MC site: **Lateral border of the junction of middle and posterior third**^Q.
- **Primary basin** for cervical metastasis is **superior deep jugular nodes (Level II)**^Q.
- For diagnosis, **wedge biopsy** is taken from the **edge of ulcer** but in **proliferative growth**, **punch biopsy** is taken^Q.

Treatment of Carcinoma Oral Tongue

Treatment of Carcinoma Oral Tongue	
T1	• Partial glossectomy with primary closure ^Q
T2	• Hemiglossectomy for small well-circumscribed and well differentiated lesion ^Q • Radiotherapy for large, poorly differentiated lesion ^Q
T3	• Total glossectomy followed by radiation ^Q
T4	• Surgery (Total glossectomy, mandibulectomy, MRND , laryngectomy) + Post-operative radiation ^Q

Management of Recurrence

- Most recurrences occur within **2 years**.
- **Radiation failure** is managed by **glossectomy**^Q.
- **Surgical failure** is managed by **radiation**^Q.
- If **recurrence** is **limited to mucosa**, it is best managed by **surgery**
- If **recurrence** is in the **soft tissue of the neck**, **palliation** is indicated

CARCINOMA OF POSTERIOR THIRD OR BASE OF TONGUE

- Remains **asymptomatic** for long time and patient **present with metastasis in cervical nodes**^Q.
- **First node involved** is **superior deep jugular nodes (Level II)**, spread is then along the jugular chain to the mid-jugular (Level III) and lower jugular (Level IV)^Q.

Clinical Features

- **Early symptoms:** **Sore throat**, **feeling of lump in throat**, and slight discomfort on swallowing
- Because many lesions are **silent**, **level II neck mass** is often the **first sign**^Q.

34. Ans. d. Radical neck dissection (Ref: Bailey 26/e p709, 25/e p740; Devita 9/e p748; Cancer of the Head and Neck by Suen and Myer 4/e p299)

LYMPH NODE METASTASIS IN CA TONGUE

- Elective or therapeutic treatment of the cervical lymphatics is recommended for virtually all patients with cancer of the oral tongue.
- It is recommended that patients with bulky metastatic deposits undergo standard radical dissection or MRND^Q.

35. Ans. b. Lateral border of anterior 2/3rd

36. Ans. a. Squamous cell carcinoma

37. Ans. c. Malignant (Ref: Bailey 25/e p595)

Type of Ulcer	Edge
Septic ulcer	• Sloping edges ^Q
Tuberculous ulcer	• Undermined edges ^Q
Carcinomatous ulcer	• Everted hard edges ^Q
Rodent ulcer	• Barely visible pearly edges ^Q
Syphilitic ulcer	• Punched-out appearance with raised indurated edges ^Q

38. Ans. c. Anterior 2/3rd lateral aspect

39. Ans. a. Excision

40. Ans. b. Carcinomatous ulcer

41. Ans. e. All of the above

42. Ans. c. Commonly adenocarcinoma

43. Ans. d. Excision of carcinoma of the jaw and lymph nodes en-bloc (Ref: Cancer of the Head and Neck by Suen and Myer 4/e p291)

COMMANDO'S OPERATION (COMBINED MANDIBULECTOMY AND NECK DISSECTION OPERATION)

- Commando's operation: Total glossectomy hemimandibulectomy + Removal of floor of mouth + Radical lymph node dissection^Q
- Indicated when carcinoma is fixed to mandible with infiltration of floor of mouth^Q.

RADIOTHERAPY IN CANCERS OF ORAL CAVITY

- SCC is vascularized and well oxygenated tends to be most radiosensitive^Q.
- Deep invasion of muscle or bone tends to decrease the response to radiotherapy
- Large cervical metastatic nodes are best managed by a combination of surgery and radiation therapy rather than by radiation alone^Q.
- Mostly given as EBRT (External Beam Radiotherapy), 60 Gray over 6 weeks^Q.

Complications of Radiotherapy

1. Xerostomia (MC)^Q
2. Mucositis^Q
3. Temporary or permanent dysgeusia
4. Osteoradionecrosis (ORN)^Q:
 - Related to carries tooth in the radiation field^Q
 - Results from decreased production of saliva and damage to microvasculature of mandible and maxilla^Q
 - Best managed with prophylactic dental care^Q
 - ORN may require daily hyperbaric oxygen treatments for 4-6 weeks, either alone or in conjunction with surgical intervention^Q

44. Ans. d. Oral cancer

45. Ans. a. Lateral border

CARCINOMA MAXILLA

46. Ans. c. Surgery and radiation: (Bailey 26/e p718, 25/e p746-747; Devita 9/e p768-771; Cancer of the Head and Neck by Suen and Myer 4/e p179)

MALIGNANT NEOPLASMS OF PARANASAL SINUSES

- Most frequently involved: Maxillary sinuses^Q > Ethmoids > Frontal > Sphenoid.
- Ethmoidal tumors mainly spread to jugulodiaphragmatic and subdiaphragmatic nodes^Q.
- Maxillary tumors mainly spread to mandibular nodes^Q.

- People working in hardwood furniture industry, nickel refining, leather work and manufacture of mustard gas have shown higher incidence of sinonasal cancer^Q.
- Cancer of the maxillary sinus is common in Bantus of South Africa where locally made snuff is used, which is found rich in nickel and chromium^Q.

- Workers of **furniture industry** develop **adenocarcinoma of the ethmoids** and upper nasal cavity^Q
- Those engaged in **nickel refining** develop **SCC** and **anaplastic carcinoma**^Q.
- **More than 80%** of the malignant tumors are of **SCC** variety^Q.

CARCINOMA OF MAXILLARY SINUS

- Common in **40-60** years of age, more common in **males**^Q
- Systemic metastasis are **rare**, may be seen in **lungs (MC)**^Q and occasionally in bone.

Clinical Features

- Early features of maxillary sinus malignancy are **nasal stuffiness, blood stained discharge, facial paraesthesia, or pain and epiphora**^Q.
- Nodal metastasis is **uncommon** and occurs only in the late stage of disease.
- **Maxillary tumors** mainly spread to **mandibular nodes**^Q.

Diagnosis:

- **CT scan:** Best non-invasive method to find the extent of disease.

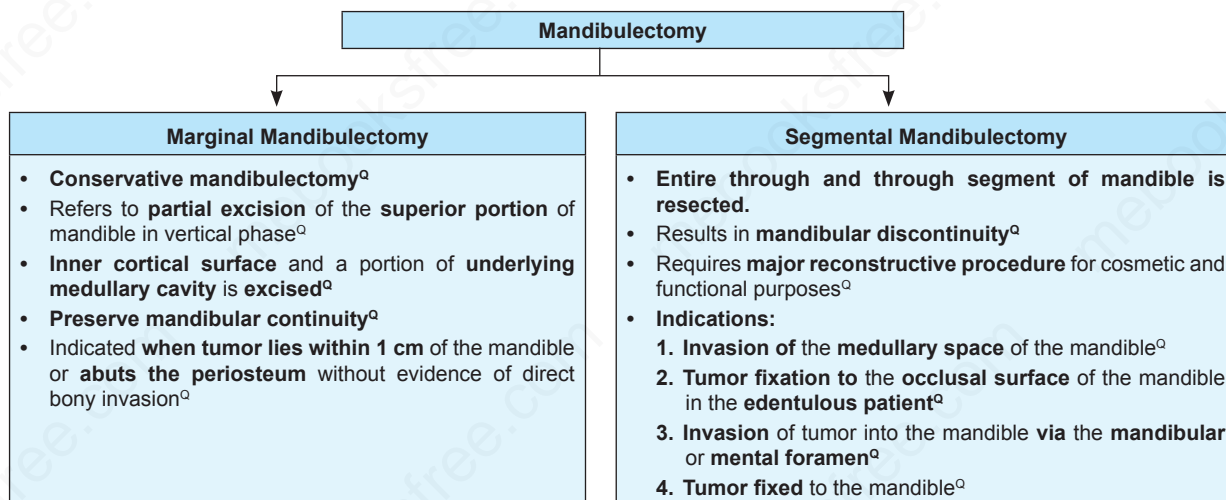
Treatment

- For **SCC**, combination of **radiotherapy** and **surgery**^Q gives better results than either alone.
- Radiotherapy can be given before or after surgery.

47. Ans. c. Submandibular nodes (Ref: Grays 39/e p577)

MANDIBLE AND MANDIBULECTOMY

48. Ans. c. Segmental mandibulectomy (Ref: Devita 9/e p746; Cancer of the Head and Neck by Suen and Myer 4/e p293-294)



TRISMUS

49. Ans. a. Surgery and Radiotherapy: (Ref: Bailey 25/e p750; en.wikipedia.org/wiki/trismus)

TRISMUS

- **Restriction to mouth opening**, including restrictions caused by **trauma, surgery or radiation**^Q.
- **Implications:** **Reduced nutrition** due to impaired mastication, **difficulty in speaking**, and **compromised oral hygiene**^Q.
- Often observed in **persons** who have **received radiation to the head and neck**, in conjunction with difficulty in swallowing^Q.
- **Limited jaw mobility** can result from **trauma, surgery, radiation treatment**, or even **TMJ problems**^Q.

- **Radiation**^Q that affects the **temporomandibular joint**, the **pterygoid muscles**, or the **masseter muscle**, is **most likely to result in trismus**.
- Some patients who have not received radiation treatment may develop **trismus secondary to scarring and edema after surgery**^Q.

CANCNUM ORIS

50. Ans. b. Follows chronic infection (Ref: www.ncbi.nlm.nih.gov)

CANCNUM ORIS (NOMA DISEASE OR GANGRENOUS STOMATITIS)

- Cancrum oris or gangrenous stomatitis, is a **gangrenous disease** leading to **tissue destruction** of the **face**, especially the **mouth** and **cheek**^Q
- **Rapidly progressive, polymicrobial, opportunistic infection** that occurs during periods of **compromised immune function**^Q.
- **Main organisms implicated: Fusobacterium, Prevotella and Borrelia vincentii**^Q

Predisposing Factors	
<ul style="list-style-type: none"> • Malnutrition or dehydration^Q • Poor oral hygiene^Q • Poor sanitation^Q • Unsafe drinking water 	<ul style="list-style-type: none"> • Recent illness^Q • Malignancy^Q • Immunodeficiency disorder, (AIDS)^Q

Clinical Features

- Mainly affects **children <12 years** in the **poorest countries of Africa**^Q.
- **Most children** are between **2-6 years**
- Mucous membranes of the **mouth develop ulcers**
- **Rapid, painless tissue degeneration**, can **degrade tissues** of the **bones** in the **face**.
- Associated with **high morbidity** and **mortality**^Q

Treatment

- Improvement in **hygiene** and **nutrition**^Q
- Progression can be halted by **antibiotics** and improved nutrition^Q
- **Reconstructive plastic surgery**^Q to repair its permanent physical effects

LUDWIG'S ANGINA

51. Ans. b. An infection of the cellular tissues around submandibular salivary gland: (Ref: Bailey 26/e p703, 25/e p731)

LUDWIG'S ANGINA

- Ludwig's angina is **infection of submandibular space**^Q.
- **Bacteriology: Mixed infections**^Q involving **both aerobes and anaerobes**^Q are common.

Etiology:

- **Dental infections** are responsible for **80% of cases**^Q.

Clinical Features:

- Marked difficulty in swallowing (**odynophagia**)^Q, with varying degree of **trismus**.

Treatment:

- **Systemic antibiotics**^Q with **incision and drainage of abscess**^Q.

DENTAL CYST AND ABNORMALITIES

52. Ans. a. Lower third molar (Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)

IMPACTED TOOTH

- Tooth that has failed to erupt completely or partially to its correct position in the dental arch and its eruption potential has been lost.
- **MC affected tooth: Lower 3rd molar**^Q > **Upper 3rd molar** > **Upper canine**

53. Ans. c. Branch of the auriculotemporal nerve: (Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)

- **Unerupted wisdom teeth, erupting teeth, and malocclusion** can cause **ear pain** secondary to direct impingement of the **auriculotemporal nerve**^Q.

54. Ans. d. Histiocytosis-X (Ref: Sutton 7/e p1542)

FLOATING TOOTH SIGN

- On radiographic examination of mandible, **erosion of the bony alveoli around the teeth**, so that they seem to be floating in space^Q
- Seen in **histiocytosis X**^Q

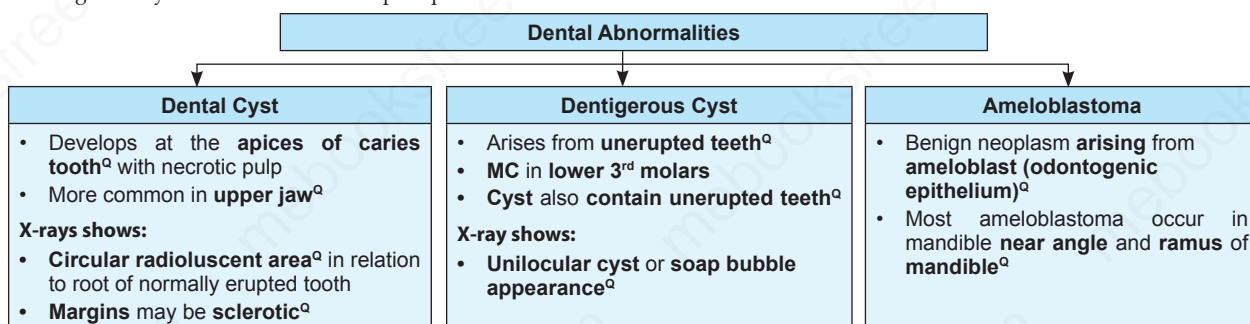
55. Ans. d. Periapical cyst (Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)

PERIAPICAL CYST (RADICULAR CYST)

- MC type of jaw cyst^Q
- Periapical cyst is **inflammatory in origin**^Q.
- Extremely common lesions found at the **apex of teeth**^Q.
- Develop as a result of **long-standing pulpitis**, caused by advanced carious lesions or by trauma to the tooth.
- **Periapical inflammatory lesions** persist as a result of the **continued presence** of **bacteria** or other offensive agents in the area.
- **Treatment:** Complete removal of offending material and appropriate restoration of the tooth or extraction.

56. Ans. c. An unerupted permanent tooth (Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)

- Dentigerous cyst arises from an unerupted permanent tooth.



57. Ans. c. Odontogenic keratocyst (Ref: Scott-Brown's Otorhinolaryngology 7/e p1924, 1925)

ODONTOGENIC KERATOCYST

- Odontogenic keratocyst is **locally aggressive** and has a **high rate of recurrence**^Q.
- Most often diagnosed in patients between 10-40 years.
- Occur most commonly in **males** within the **posterior mandible**, particularly in the region of **3rd molar tooth**^Q.
- Radiographically present as **well-defined unilocular** or **multilocular radiolucencies**.

- Odontogenic keratocysts are characterized by an epithelial lining that is parakeratinized and stratified.
- It is characterized by basal layer of neatly arranged, palisaded, columnar and cuboidal cells above which are several layers of squamous epithelium. This **lining** has a **high mitotic rate** and **rarely may become dysplastic** and **develop into squamous cell carcinoma**^Q.

Treatment:

- **Aggressive and complete removal** of the lesion
- **Recurrence rates** for **inadequately removed lesions** can reach **60%**^Q.

58. Ans. a. Hyaline bodies of odontogenic cyst (Ref: Shafers 6/e p268)

RUSHTON BODIES

- Rushton bodies or hyaline bodies of odontogenic cysts feature as **eosinophilic, straight or curved, irregular or rounded structure** within the **epithelial lining** of odontogenic cyst.
- Rushton bodies occur almost **exclusively** within odontogenic cyst.

MISCELLANEOUS

59. Ans. a. Watchful expectancy (Ref: Bailey 25/e p716, 717)

Asymptomatic hemangioma on ventral surface of the tongue in 10 years old boy is treated by watchful expectancy.

HEMANGIOMA

- Mucosal hemangiomas can occur in **oral cavity** or **oropharynx**^Q.
- **Mostly** seen in **children**^Q
- When hemangiomas are **present at birth** or in **young children**, they should be **only observed** for some period as **spontaneous regression** can occur^Q.

60. Ans. a. Chemotherapy (Ref: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2640019/>)

PHARYNGOCUTANEOUS FISTULA

- Pharyngocutaneous fistula (PCF) is the MC complication after total laryngectomy^Q.
- Reported incidence: 3-65%
- Appears in the **early post-operative period** after total laryngectomy^Q (3rd- 8th post-operative day).
- Risk Factors:
 - Wound closure under tension^Q
 - Concurrent neck dissection^Q
 - Prior radiation therapy^Q

61. Asn. a. T₃ N₂ M₀, b. T₂ N₂ M₀, c. T₄ N₂ M₀, d. T₃ N₃ M₀

62. Ans. c. Gingiva

EPULIS

- Epulis is any **benign lesion** situated on the **gingiva**.
- Three types: fibromatous, ossifying and acanthomatous.

63. Ans. a. Benign

64. Ans. b. Aphthous ulcer (Ref: Robbins 8/e p724)

APHTHOUS ULCER

- Also known as a **canker sore**^Q
- A type of mouth ulcer that presents as a **painful open sore** inside the **mouth** or **upper throat** characterized by a **break in the mucous membrane**^Q.
- Its **cause is unknown**, but they are **not contagious**.
- Also known as **aphthous stomatitis** and alternatively as **Sutton's Disease**, especially in the case of **major, multiple, or recurring ulcers**^Q.

Types of Aphthous Ulcer		
Minor ulceration	Major Ulcerations	Herpetiform Ulcerations
<ul style="list-style-type: none"> • Size 3-10 mm • MC aphthous ulcers^Q • Appear as erythematous halo^Q with yellowish or grayish color. • Pain^Q is the characteristic symptom • May last about 2 weeks 	<ul style="list-style-type: none"> • Size >10 mm^Q • Appearance similar to minor ulcerations • More painful • Take >1 month to heal and leave a scar^Q. • Typically develop after puberty with frequent recurrences^Q. 	<ul style="list-style-type: none"> • Characterized by small, numerous, 1-3 mm lesions that form clusters. • Most severe form^Q • Occurs more frequently in females • Onset is often in adulthood. • Typically heal in <1 month without scarring^Q.

Etiology

- Exact cause is **unknown**^Q
- Citrus fruits, physical trauma, lack of sleep, sudden weight loss, food allergies, immune system reactions, and deficiencies in vitamin B₁₂, iron, and folic acid may contribute to their development.
- MC trigger: **Trauma to the mouth**^Q

65. Ans. d. Carcinomatous ulcers

Aphthous ulcers, tubercular and herpetic ulcers are painful.

CARCINOMATOUS ULCER

- Carcinomatous ulcers are **painless** but may become painful in advanced stages, with extension into surrounding tissues.

66. Ans. b. Syphilis (Ref: Robbins 8/e p374)

- Syphilis chancres can occur in the mouth and they are **painless**.

67. Ans. d. Curettage (Ref: medind.nic.in/ibn/t06/i4/ibnt06i4p677)

- Reparative granuloma of Jaw is treated by curettage.

GIANT CELL REPARATIVE GRANULOMA

- Giant cell reparative granuloma is an apparently **reactive intraosseous lesion** of the **mandible** and **maxilla** following **trauma induced intraosseous hemorrhage**^Q and containing prominent giant cells.
- Also known as **Central giant cell granuloma**^Q
- **MC site: Anterior part of mandible**^Q (2/3rd of cases) between the 2nd **premolar** and 2nd **molar**^Q with extension across the midline.
- 2nd MC site: **Small bones of hands and feet**^Q

Clinical Features

- It is a **disease of the young** presenting as a **painless swelling** in the anterior jaw and
- Radiographically appearing as a **lytic expansile lesion** with a characteristic **tendency of resorbing the root tips** of adjacent unerupted teeth.

Treatment

- **Curettage or local excision**^Q
- **Recurrence rate: 22-50%**
- Lesion eradication typically **does not require >2 excisions**.
- **Chemical cautery, electrocautery, cryotherapy**, calcitonin, Interferon alpha and intralesional steroids are used for **more aggressive and recurrent lesions**.

68. Ans. d. Surgery and radiotherapy (Ref: *Mastery of Surgery* 5/e p308; *Bailey* 26/e p716, 25/e p740)

Salivary Glands

MULTIPLE CHOICE QUESTIONS

SALIVARY GLAND TUMORS

- Which among the following is most common neoplasm of salivary gland? *(Recent Question 2014, WBPG 2012, AIIMS June 98, All India 2002)*
 - Pleomorphic adenoma
 - Adenoid cystic carcinoma
 - Mucoepidermoid carcinoma
 - Mixed tumour
- Most common tumor of parotid gland is:
 - Squamous cell carcinoma
 - Pleomorphic adenoma *(DNB 2008, 2000, AIIMS June 93)*
 - Adenolymphoma
 - None of the above
- Best diagnostic modality for parotid swelling is:
 - Enucleation
 - FNAC *(AIIMS Nov 94)*
 - Superficial parotidectomy
 - Excisional biopsy
- Swelling of deep lobe of parotid gland presents as swelling in: *(DNB 2001)*
 - Parapharyngeal space
 - Cheek
 - Temporal region
 - Below the ear
- True about parotid tumor: *(PGI Nov 2010)*
 - Facial nerve involvement indicates malignancy
 - Pleomorphic adenoma is MC variety
 - Malignant disease is MC variety
 - Superficial parotidectomy is the treatment of choice
- About 50% the tumors are benign and even malignant tumors of this salivary gland are slow growing:
 - Parotid gland
 - Sublingual gland
 - Submandibular gland
 - All of the above
- Most common site of minor salivary gland tumor: *(MHSSMCET 2005)*
 - Cheek
 - Palate
 - Sub-lingual gland
 - Tongue
- Open biopsy is done for salivary gland tumor unless they are arising from: *(Recent Question 2015)*
 - Palate
 - Buccal
 - Sublingual
 - Parotid

PLEOMORPHIC ADENOMA

- Regarding pleomorphic adenoma of salivary gland true statement(s) is/are: *(PGI Dec 2008)*
 - Parotid gland is most commonly involved
 - Malignant transformation does not occur
 - Also called mixed tumour
 - More commonly found in men than women
 - Superficial parotidectomy is treatment of choice
- True regarding benign mixed parotid tumour is: *(DNB 2005)*
 - Slow growing and lobular
 - Firm and capsulated
 - 50% of parotid tumour
 - All of the above
- Most common tumor of parotid gland? *(MHPGMCET 2007)*
 - Warthin's tumor
 - Pleomorphic adenoma
 - Adenocarcinoma
 - Hemangioma
- Treatment of choice for pleomorphic adenoma: *(Recent Question 2015, 2014, DNB 2008, DPG 2008, MCI Sept 2010, 2007, AIIMS Nov 2001, Nov 95, All India 97, PGI Dec 99)*
 - Superficial parotidectomy
 - Radical parotidectomy
 - Enucleation
 - Radiotherapy
- Ramavati, a 40-years old female presented with a progressively increasing lump in the parotid region. On oral examination, the tonsil was pushed medially, Biopsy showed it to be pleomorphic adenoma. The appropriate treatment is: *(AIIMS June 2001)*
 - Superficial parotidectomy
 - Lumpectomy
 - Conservative total parotidectomy
 - Enucleation
- All are true for pleomorphic adenoma except: *(PGI Dec 99)*
 - Arises from parotid
 - May turn into malignant
 - Minor salivary glands involved
 - None
- Mixed tumors of the salivary glands are: *(All India 2006)*
 - Most common in submandibular gland
 - Usually malignant
 - Most common in parotid gland
 - Associated with calculi

16. Which of the following is an indication of radiotherapy in pleomorphic adenoma of parotid? (All India 2004)

- Involvement of deep lobe
- 2nd histologically benign recurrence
- Microscopically positive margins
- Malignant transformation

17. Mixed parotid tumour arises from: (PGI 80, DPG 87, 88)

- Epithelium
- Epithelium + Mesenchymal
- Mesenchymal
- None of the above

18. All are true about pleomorphic adenoma except: (DNB 2014)

- Malignant transformation risk is high
- Mixed tumor
- Benign tumour
- Encapsulated

WARTHIN'S TUMOR

19. True statement regarding Warthin's tumor:

- Common in females (JIPMER 2010)
- Most malignant
- Hot spots on Tc-99 scan
- Most common tumor of minor salivary gland

20. Exclusively found in parotid gland: (PGI May 2011)

- Warthin's tumor
- Acinic cell
- Pleomorphic
- Adenocarcinoma
- Mucoepidermoid

21. Warthin's tumour is: (DNB 2012, AIIMS May 2005, June 2003)

- An adenolymphoma of parotid gland
- A pleomorphic adenoma of parotid
- A carcinoma of the parotid
- A carcinoma of submandibular salivary gland

22. Treatment of choice for Warthin's tumour:

- Superficial parotidectomy
- Enucleation (AIIMS Nov 2001, All India 98, 96)
- Radiotherapy
- Injection of a sclerosant agent

23. Hot spot on Tc-99 is seen in which parotid tumour?

- Adenolymphoma
- Adenoid cystic carcinoma (JIPMER 2014, 2010; AIIMS May 2013)
- Acinic cell tumour
- Adenocarcinoma

24. Cystic spaces lined by double layer of neoplastic epithelial cells resting on dense lymphoid tissue is a feature of: (APPG 2015)

- Dermoid cyst
- Warthin tumor
- Aneurysmal bone cyst
- Hashimoto's thyroiditis

MUCOEPIDERMOID CARCINOMA

25. Most common malignant tumour of parotid is:

- Epidermoid carcinoma (DNB 2011, 2010, DPG 2008)
- Mucoepidermoid carcinoma
- Squamous cell carcinoma
- Adenocarcinoma

26. Mucoepidermoid carcinoma of parotid arises from:

- Secretory cells
- Excretory cells (PGI June 99)
- Myoepithelial cells
- Myofibril

27. Mucoepidermoid carcinoma is seen in: (MHSSMCET 2005)

- Sebaceous gland
- Pancreas
- Parotid gland
- All

ADENOID CYSTIC CARCINOMA

28. The most common tumour of the minor salivary gland is:

- Mucoepidermoid carcinoma (DNB 2013, WBPG 2012, COMEDK 2008)
- Acinic cell carcinoma
- Adenoid cystic carcinoma
- Pleomorphic adenocarcinoma

29. Tumor with perineural invasion:

(Recent Question 2015, DNB 2009, AIIMS Nov 2010, MHSSMCET 2007)

- Adenocarcinoma
- Adenoid cystic carcinoma
- Basal cell carcinoma
- Squamous cell carcinoma

30. All the following tumors can spread perineurally except:

- Adenoid cystic carcinoma of salivary gland
- Carcinoma gallbladder (MHSSMCET 2007)
- Hilar cholangiocarcinoma
- None of the above

31. Which among the following parotid tumor spreads through neural sheath?

(Karnataka 2013, NEET Pattern, DNB 2013, AIIMS June 97, 96)

- Mixed parotid tumor
- Adenoid cystic carcinoma
- Squamous Cell carcinoma
- Oxyphilic lymphoma

32. The most common tumor of the minor salivary gland is:

- Mucoepidermoid carcinoma (COMEDK 2008)
- Acinic cell carcinoma
- Adenoid cystic carcinoma
- Pleomorphic adenocarcinoma

33. Swiss cheese pattern is seen in:

- Warthin's tumor (DPG 2007)
- Adenoid cystic carcinoma
- Pleomorphic adenoma
- Mucoepidermoid carcinoma

34. Adenoid cystic carcinoma of parotid gland all are true except:

- Most common malignant tumour of minor salivary gland
- Most common submandibular gland tumour
- Spreads perineurally (UPPG 2010)
- Local recurrence is common
- Radiotherapy is the treatment of choice

ACINIC CELL CARCINOMA

35. Acinic cell tumor is tumor of:

- Parotid gland
- Breast (MHPGMCET 2002)
- Parathyroid
- Thyroid

36. Acinic cell carcinomas of the salivary gland arise most often in the:

- Parotid gland
- Minor salivary glands (All India 2006)
- Submandibular gland
- Sublingual gland

CARCINOMA PAROTID

37. Which of the following is false about salivary gland tumors?

- Pleomorphic adenoma is MC tumor of parotid
- Adenoid cystic carcinoma MC occurs in minor salivary glands (DPG 2008, 2007)
- Warthin's tumor is MC malignant tumor of salivary glands
- Perineural invasion is seen in adenoid cystic carcinoma

38. True statement (s) about salivary gland tumors:

- Pleomorphic adenoma can arise in submandibular gland
- Warthin's tumour arises from submandibular gland
- Pleomorphic adenoma is most common tumour of submandibular gland (PGI June 2004)
- Acinic cell carcinoma is most malignant
- Frey's syndrome is due to injury of auriculotemporal nerve

39. All of the following statements about lymphoepithelioma of the parotid gland are true, except:

- Parotid gland is the most common site of lymphoepithelioma in the head and neck region
- It is associated with EBV infection (All India 2009)
- It is highly radiosensitive
- It is a type of squamous cell carcinoma

40. Most of the parotid tumor are managed by: (All India 97)

- Total parotidectomy
- Radical parotidectomy
- Superficial parotidectomy
- Radical parotidectomy and neck dissection

41. All of the following are true regarding malignant salivary gland tumours except: (DNB 2010)

- Painful
- Present with skin ulceration
- Cervical lymphadenopathy
- Simple enucleation is treatment of choice

SALIVARY GLAND STONES

42. Commonest salivary gland to get stones:

(APPG 2015, Recent Question 2014, NEET 2013, DNB 2011, 2003, DPG 2006, MCI March 2005, 2007, AIIMS Nov 99, June 99)

- Parotid
- Submandibular
- Minor salivary gland
- Sublingual

43. In which one of the following conditions the sialography is contraindicated? (All India 2005)

- Ductal calculus
- Chronic parotitis
- Acute parotitis
- Recurrent sialadenitis

44. Treatment of submandibular salivary gland duct calculi is:

- Excision of submandibular gland (TN 90)
- Opening the duct at the frenulum
- Opening the duct and removal of calculus
- Excision of gland and duct

45. All of the following statement regarding stones in the submandibular gland are true except: (MCI March 2007)

- 80% of stones occur in the submandibular gland
- Majority of submandibular stones are radioluscent
- Stones are the most common cause of obstruction within the submandibular gland
- Patient presents with acute swelling in the region of the submandibular gland

46. Investigation using dye to find out stone in salivary gland:

(Recent Question 2013)

- Sialography
- Mammography
- MR angiography
- USG

47. What percent of submandibular salivary gland stones are radio-opaque? (MHCET 2016)

- 10%
- 70%
- 80%
- 90%

48. What are the three cranial nerves that are at risk during the removal of submandibular salivary gland? (APPG 2016) Place it after question no. 46 in chapter no 36 Salivary glands.

- Marginal mandibular branch of facial nerve, glossopharyngeal nerve and spinal accessory nerve
- lingual nerve, marginal mandibular branch of facial nerve & spinal accessory nerve
- hypoglossal nerve, facial nerve & glossopharyngeal nerve
- marginal mandibular branch of facial nerve, lingual nerve & hypoglossal nerve

PAROTIDECTOMY AND COMPLICATIONS

49. After removal of parotid gland, patient is having sweating on the cheeks while eating. In this complication seen after parotidectomy, the auriculotemporal nerve which contains parasympathetic secretomotor fibers to parotid gland is fused with which nerve? (AIIMS May 2012)

- Greater petrosal nerve
- Facial nerve
- Greater auricular nerve
- Buccal nerve

50. Management of Frey's syndrome include following except? (MHSSMCET 2010, 2008)

- Botulinum toxin
- Temporal fascial graft
- Aluminum chloride
- Antiperspirants

51. The 'Starch iodine test' is useful to diagnose?

(MHSSMCET 2011)

- Wegener's granulomatosis
- Cat scratch disease
- Sarcoidosis
- Frey's syndrome

52. Which of the following is not true regarding radical parotidectomy? (MHSSMCET 2009)

- In radical parotidectomy the facial nerve is preserved
- Anesthesia of the ear lobe due to sectioning of the great auricular nerve can occur
- Gustatory sweating (Frey's syndrome) can occur
- None

53. Which of the following group constitute Frey's syndrome?

- Hyperhydrosis, enophthalmos and miosis
- Anhidrosis, enophthalmos and miosis (Karnataka 94)
- Redness and sweating over the auriculotemporal region during meal
- Pain over the distribution of the auriculotemporal nerve during meal

54. The nerve sacrificed in parotid surgery: (DNB 2013, APPG 98)

- Auriculotemporal
- Facial
- Buccal
- Cervico facial

55. Incision for superficial parotidectomy: (WBPG 2015)

- L-shaped
- Y-shaped
- S-shaped
- Z-shaped

PAROTID FISTULA

56. Newman and Seabrook's operation is used for:

(PGI 79, AIIMS 84)

- Repair of parotid fistula
- For parotid calculi
- For carcinoma of tongue
- For treatment of recurrent chronic parotitis

57. Seabrook's operation is done for: (MHSSMCET 2006)

- Parotid duct fistula
- Thyroglossal fistula
- Thyroglossal cyst
- Branchial fistula

RANULA

58. Which of the following best represents 'ranula'?

(AIIMS May 2005)

- A type of epulis
- A thyroglossal cyst
- Cystic swelling in the floor of mouth
- Forked uvula

59. What is ranula? (DNB 2007, 2005, TN 91)

- Retention cyst of sublingual gland
- Retention cyst of submandibular gland
- Extravasation cyst of sublingual glands
- Extravasation cyst of submandibular glands

60. Which of the following is not true about ranula?

- Arises from sublingual salivary glands
- Pseudocyst (MHSSMCET 2010)
- Appearance is like "Frog's belly"
- None

61. Excision of ranula is associated with injury to:

(DNB 2010, MHSSMCET 2007, PGI 96)

- Lingual nerve
- Lingual artery
- Parotid gland
- Submandibular duct

62. Which of the following statements about 'ranula' is most correct?

(All India 2011)

- It is type of epulis
- It is a cystic swelling in the floor of mouth
- It is a type of thyroglossal cyst
- It is a type of mucus retention cyst

63. Plunging ranula is:

(Recent Question 2015)

- Cystic growth of sublingual gland
- Lymph node
- A tumor in floor of mouth
- None

SALIVARY GLANDS ANATOMY AND PHYSIOLOGY

64. True about salivary gland:

(PGI Dec 2006)

- There are more than 400 minor glands
- 90% of all parotid tumors are malignant
- 90% of minor salivary tumors are malignant
- Superficial parotidectomy done in parotid tumors
- Warthin's tumor common in parotid

65. Which of the following is not a landmark for facial nerve during parotid surgery?

(All India 2008)

- Digastric muscle
- Inferior belly of omohyoid
- Tragal pointer
- Retrograde dissection of distal branch

66. The parotid duct is known as:

(APPG 84)

- Wharton's duct
- Stenson's duct
- Duct of Santorini
- Duct of Wirsung

67. Nerve which lies in association to Wharton's duct is:

(AIIMS 87)

- Hypoglossal
- Lingual
- Facial
- Spinal accessory

68. Inflammatory enlargement of deep lobe of parotid gland is seen in:

(PGI 81, DPG 92)

- Posterior pharyngeal wall
- Supratonsillar area
- Anterior tonsillar pillar
- Tonsillar fossa/bed

69. Which of the following nerves lies closest of the Wharton's duct?

(COMEDK 2007)

- Hypoglossal
- Lingual
- Chorda tympani
- Facial

70. Structure exposed after parotid surgery is:

(DPG 2008)

- Internal jugular vein
- Facial nerve
- Muscles
- Facial artery

71. All of the following are anatomical markers for localization of facial nerve during parotid surgery, except:

(DPG 2008)

- Posterior belly of digastric
- Mastoid process
- Inferior belly of omohyoid
- Bony external auditory meatus

72. In submandibular gland surgery, the nerve least likely to be injured is:

(DPG 2011, JIPMER 93)

- Inferior alveolar nerve
- Hypoglossal nerve
- Lingual nerve
- Mandibular branch of facial nerve

73. Most common location of ectopic submandibular salivary gland tissue is:

(MCI Sept 2009, UPPG 2002)

- Cheek
- Palate
- Angle of mandible
- Tongue

74. In surgery of submandibular salivary gland, nerve often involved:

(PGI June 97)

- Hypoglossal
- Glossopharyngeal
- Facial
- Lingual

SJOGREN'S SYNDROME

75. True regarding Sjogren's syndrome are all of the following except:

(MCI Sept 2009)

- Autoimmune condition
- Males are commonly affected
- Progressive destruction of lacrimal and salivary gland
- No single laboratory investigation is pathognomonic

76. Sjogren's syndrome refers to disease of:

(AIIMS 85)

- Parotid glands
- Thyroid disease
- Parathyroid glands
- Multiple endocrine neoplasia

77. Biopsy of the parotid gland in a patient with Sjogren's disease shows:

(JIPMER 2011)

- Neutrophils
- Lymphocytes
- Eosinophils
- Basophils

MISCELLANEOUS

78. Bacterial pyogenic parotitis affecting the parotid gland is most common after:

(MCI March 2008)

- Uveo-parotid fever
- Mumps
- Debilitation after major surgery
- After administration of iodine

79. Bilateral parotid enlargement does not occur in:

(AIIMS Nov 96)

- Sjogren's syndrome
- Sarcoidosis
- SLE
- Chronic pancreatitis

80. A bacterial pyogenic parotitis is found most commonly in which of the following?

(Orissa 99)

- Mumps
- Debilitation after major surgery
- Drug reaction (iodine mumps)
- Uveoparotid fever

81. Sialosis refers to:

(Karnataka 2006)

- Bilateral parotitis
- Sjogren's syndrome
- Non-inflammatory parotid enlargement
- Bilateral salivary duct ectasia

82. Ackerman's tumour is:

(DPG 2008)

- Mucoepidermoid carcinoma
- Epidermoid carcinoma
- Squamous cell carcinoma
- Adenocarcinoma

83. Bilateral parotid enlargement is seen in:

(DNB 2008)

- Wegner's granulomatosis
- Sjogren's syndrome
- Kimura's disease
- All of the above

EXPLANATIONS

SALIVARY GLAND TUMORS

1. Ans. a. Pleomorphic adenoma (Ref: Bailey 26/e p732-733, 25/e p757, 761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p480-490)

- MC neoplasm of salivary gland: Pleomorphic adenoma^Q
- MC malignant tumor of salivary gland: Mucoepidermoid carcinoma^Q
- MC neoplasm of salivary gland in children: Hemangioma^Q
- MC malignant tumor of salivary gland in children: Mucoepidermoid carcinoma^Q
- MC malignant tumor of minor salivary glands: Adenoid cystic carcinoma^Q

- Best diagnostic modality for parotid swelling: FNAC^Q
- Open incisional biopsy is contraindicated^Q due to tumor cell implantation and formation of parotid fistula^Q.
- Best imaging investigation for salivary gland neoplasms: MRI^Q

ALL SALIVARY GLAND TUMORS ARE MOST COMMON IN PAROTID EXCEPT

- Adenoid cystic carcinoma: MC malignant tumor of minor salivary glands^Q
- Squamous cell carcinoma: Mostly seen in submandibular gland^Q

ETIOLOGY OF SALIVARY GLAND TUMORS

- Radiotherapy to head and neck (for mucoepidermoid carcinoma)^Q
- EBV infection (for lymphoepithelial carcinoma)^Q
- Exposure to silica dust, nitrosamines^Q
- Increased risk in females with early menarche and nulliparity^Q
- Trisomy 5 in primary mucoepidermoid carcinoma of minor salivary glands
- Polysomy of 3 and 17 especially in adenoid cystic carcinoma
- Translocation involving chromosome 11 in mucoepidermoid carcinoma

2. Ans. b. Pleomorphic adenoma 3. Ans. b. FNAC 4. Ans. a. Parapharyngeal space
5. Ans. a. Facial nerve involvement indicates malignancy, b. Pleomorphic adenoma is MC variety, d. Superficial parotidectomy is the treatment of choice

In parotid tumors, rapid growth, pain, paraesthesia, enlarged cervical LN and restriction of jaw movements, facial weakness or skin invasion and fixation of mastoid tip is suggestive of malignant transformation.

6. Ans. a. Parotid gland (Ref: Bailey 26/e p723, 732-733, 25/e p757, 761; Devita 9/e p774-778; Cancer of the Head and Neck by Suen and Myer 4/e p480-490)

IN SALIVARY GLAND TUMORS

- MC site of minor salivary gland tumors are oral cavity (hard palate)^Q
- There are no minor salivary glands in the anterior half of the palate, so tumors arise on posterolateral hard palate and all of the soft palate^Q
- Malignancy varies inversely with the size of gland^Q (most of minor salivary gland tumors are malignant)
 - Parotid gland: 25%^Q malignant, Submandibular and Sublingual gland: 50%^Q malignant, Minor salivary glands: 75%^Q malignant
- Open surgical biopsy is contraindicated^Q, as it can cause tumor seeding of the track
 - Most salivary gland tumors are radioresistant^Q
 - Neutron therapy has been used in the management of unresectable salivary gland tumors^Q
 - Name of incision for parotidectomy: Sistrunk incision^Q

7. Ans. b. Palate (Ref: Bailey 25/e p752; Devita 9/e p777-778; Cancer of the Head and Neck by Suen and Myer 4/e p487-489)

- MC malignant tumor of minor salivary glands: Adenoid cystic carcinoma^Q
- MC site of origin is in minor salivary glands located in oral cavity (hard palate) followed by sinonasal tract^Q

8. Ans. d. Parotid

PLEOMORPHIC ADENOMA

9. Ans. a. Parotid gland is most commonly involved, c. Also called mixed tumour, e. Superficial parotidectomy is treatment of choice (Ref: Bailey 26/e p732, 25/e p761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p414)

PLEOMORPHIC ADENOMA

- It is **MC benign** salivary gland tumor and **MC tumor of major salivary glands**^Q.
- **MC site is parotid tail (superficial lobe)**^Q
- Less common in the submandibular glands and sublingual glands, relatively rare in minor salivary glands.

- Known as **mixed tumor**^Q as it is composed of both **epithelial** and **mesenchymal** components
- Encapsulated but sends **pseudopodia (finger-like projections)**^Q into surrounding glands, **enucleation is not done** to avoid recurrence.

- Pleomorphic adenoma is **unicentric** but **recurrences are multicentric**^Q
- Usually **not involve the facial nerve**.

Clinical Features

- Presents as **painless swelling** without any appreciable change in size, with typical site at **below, in front and behind the ear lobule**^Q.
- Slow growing lobular tumor affecting **women** around **40 years**.
- Pleomorphic adenoma involving deep lobe may push the tonsil and pillars of fauces towards midline and known as **dumbbell tumor**^Q with component both in neck and oral cavity.

Diagnosis

- **FNAC** is diagnostic^Q

Treatment

- Superficial parotidectomy (**Patey's operation**)^Q
- Excision of whole gland in cases of pleomorphic adenoma of submandibular gland
- Name of incision for parotidectomy: Lazyvs', modified blairs or sistrunk incision

Complications

- **Malignant change (3-5%)**
 - Known as **carcinoma ex pleomorphic adenoma** or **malignant mixed tumor**
 - **Rapid growth, pain, paraesthesia, enlarged cervical LN** and restriction of jaw movements, **facial weakness** or skin invasion and **fixation of mastoid tip** is suggestive of malignant transformation
 - Histological findings suggestive of malignant change are microscopic foci of **necrosis, hemorrhage, calcification** and **excessive hyalinization**^Q
 - Prognosis for invasive carcinoma depends on degree of local infiltration
- **Recurrence**^Q, particularly after enucleation

10. Ans. d. All of the above 11. Ans. b. Pleomorphic adenoma 12. Ans. a. Superficial parotidectomy
13. Ans. c. Conservative total parotidectomy
14. Ans. d. None (Ref: Robbins 8/e p758)

- Pleomorphic adenoma arises most commonly from the parotid gland^Q.
- Pleomorphic adenoma is less common in the submandibular gland and sublingual glands; relatively rare in the minor glands^Q.

15. Ans. c. Most common in parotid gland
16. Ans. c. Microscopically positive margins (Ref: Devita 9/e p776; Cancer of the Head and Neck by Suen and Myer 4/e p499-501)

Indications of radiotherapy in Salivary Gland Tumors

- | | |
|--|---|
| <ul style="list-style-type: none"> • High grade tumors^Q • Large primary lesions^Q • Perineural invasion^Q | <ul style="list-style-type: none"> • Bone invasion^Q • Cervical LN metastasis^Q • Positive surgical margins^Q |
|--|---|

17. Ans. b. Epithelium + Mesenchymal 18. Ans. a. Malignant transformation risk is high

WARTHIN'S TUMOR

19. Ans. c. Hot spots on Tc-99 scan (Ref: Bailey 25/e p761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p414)

WARTHIN'S TUMOR (PAPILLARY CYSTADENOMA LYMPHOMATOSUM)

- **Second MC benign tumor** of the **parotid gland**^Q
- Derived from **salivary tissues inclusion in lymph nodes**^Q (so can arise from cervical nodes)
- Occurs **exclusively in parotid gland**^Q and almost always occur in the **lower portion of parotid**^Q overlying the angle of mandible.

WARTHIN'S TUMOR (PAPILLARY CYSTADENOMA LYMPHOMATOSUM)

- Second MC benign tumor of the parotid gland^Q
- Derived from salivary tissues inclusion in lymph nodes^Q (so can arise from cervical nodes)
- Occurs exclusively in parotid gland^Q and almost always occur in the lower portion of parotid^Q overlying the angle of mandible.

- Consists of both epithelial and lymphoid elements^Q thus known as adenolymphoma (probably arises from remnants of parotid tissue trapped in lymph nodes within the parotid gland)
- More common in males^Q, in 5th to 7th decade^Q.
- Associated with smoking^Q, bilateral in 10%^Q cases, never involves facial nerve.
- It is well encapsulated, cystic, extremely slow growing tumor, never turns malignant^Q.

- Peculiar feature of Warthin's tumor: 'hot' spot in 99m Tc-pertechnate scan^Q. (Other tumors of the parotid show 'cold' spot)

Histopathology

- Papillary cystic pattern lined with columnar oncocytes and cuboidal cells with marked lymphoid component^Q
- Lined by a double layer of neoplastic epithelial cells^Q resting on a dense lymphoid stroma sometimes bearing germinal centers.

- The double layer of lining cells distinctive^Q, with a surface palisade of columnar cells resting on a layer of cuboidal to polygonal cells

Diagnosis

- FNAC is best diagnostic modality

Treatment

- Superficial parotidectomy^Q

20. Ans. a. Warthin's tumor, b. Acinic cell

22. Ans. a. Superficial parotidectomy

24. Ans. b. Warthin tumor

21. Ans. a. An adenolymphoma of parotid gland

23. Ans. c. Acinic cell tumour

MUCOEPIDERMOID CARCINOMA

25. Ans. b. Mucoepidermoid carcinoma (Ref: Bailey 26/e p732, 25/e p761; Devita 9/e p774-777; Cancer of the Head and Neck by Suen and Myer 4/e p489)

MUCOEPIDERMOID CARCINOMA

- MC malignant tumor of parotid, MC radiation induced neoplasm^Q of parotid
- MC malignant salivary gland tumor in children^Q

- Consist of admixture of squamous cells, mucous secreting cells, intermediate cells and clear or hydropic cells^Q
- Include two major elements- mucin producing cells and epithelial cells^Q of epidermoid variety

- Greater the epidermoid content, more malignant is the behavior
- Usually not causes facial paralysis^Q
- Of two types: Low grade and high grade

Low Grade type	High Grade Type
<ul style="list-style-type: none"> • Well circumscribed mass having cystic mucinous^Q material • Mucin producing^Q cells predominate • Well differentiated • More common in children • TOC: Superficial or total parotidectomy^Q 	<ul style="list-style-type: none"> • Grossly infiltrative and has less tendency to cyst formation (hard tumor) • Squamous cells predominate • Poorly differentiated^Q • Less common • TOC: Total parotidectomy +/- radical neck dissection

26. Ans. a. Secretory cells

27. Ans. c. Parotid gland

ADENOID CYSTIC CARCINOMA

28. Ans. c. Adenoid cystic carcinoma (Ref: Bailey 26/e p723, 25/e p752; Devita 9/e p777-778; Cancer of the Head and Neck by Suen and Myer 4/e p487-489)

ADENOID CYSTIC CARCINOMA

- Second MC malignant tumor after mucoepidermoid carcinoma^Q
- MC malignant tumor in submandibular, sublingual and minor salivary glands^Q
 - MC site of origin is in minor salivary glands located in oral cavity (hard palate) followed by sinonasal tract^Q
 - MC type is Cribiform pattern^Q, and is characterized by "Swiss-Cheese" appearance^Q
 - It has neurotropic properties, MC involved nerves are facial nerve^Q, mandibular (V3) and maxillary branches of trigeminal nerve.
- Skip lesions^Q along nerves are common, leading to treatment failure, because of difficulty in treating full extent of invasion.
- May grow along haversian system of bone without showing bone destruction
- It is tracherous tumor as it appears benign even when it is malignant

Clinical Features

- Characterized by its tendency to invade perineural tissues and lymphatics, thus causes pain (which may be prominent and early symptom) and facial nerve paralysis^Q
- High incidence of distant metastasis but indolent growth^Q

- Incidence of distant metastasis is correlated with stage of disease (size of primary tumor and status of LNs)
- MC site of metastasis is lung, lung metastasis are usually multiple and prolonged survival without treatment is not unusual^Q

Diagnosis

- Best diagnostic modality is FNAC^Q
- MRI is radiological IOC as it detects early perineural spread and intracranial extension^Q

Treatment

- Radical excision (irrespective of benign appearance) with largest cuff of normal tissues around the boundaries of tumor (poorly encapsulated with infiltrating nature)^Q.
- Post-op radiotherapy should be given if margins are positive^Q.

29. Ans. b. Adenoid cystic carcinoma

30. Ans. d. None of the above (Ref: Bailey 25/e p752; Devita 9/e p778, 1021, 1037; Cancer of the Head and Neck by Suen and Myer 4/e p488)

Perineural Spread is seen in	
<ul style="list-style-type: none"> • Adenoid cystic carcinoma^Q • CA GB^Q 	<ul style="list-style-type: none"> • Ductal adenocarcinoma of pancreas^Q • Cholangiocarcinoma^Q

31. Ans. b. Adenoid cystic carcinoma

32. Ans. c. Adenoid cystic carcinoma

33. Ans. b. Adenoid cystic carcinoma

34. Ans. b. Most common submandibular gland tumour

ACINIC CELL CARCINOMA

35. Ans. a. Parotid gland

36. Ans. a. Parotid gland (Ref: Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p489-490)

ACINIC CELL CARCINOMA

- Rare tumors composed of cells resembling the normal serous acinar cells^Q of salivary glands
- Occur almost exclusively in parotid glands^Q
 - Low grade malignancy, mostly affecting women
 - Present as round or ovoid solitary encapsulated tumor
- Histologically tumor is characterized by highly cellular structure with relative absence of stroma
- Tumor tends to involve the regional lymph nodes
- Treatment: Radical excision^Q

CARCINOMA PAROTID

37. Ans. c. Warthin's tumor is MC malignant tumor of salivary glands

38. Ans. a. Pleomorphic adenoma can arise in submandibular gland, c. Pleomorphic adenoma is most common tumour of sub mandibular gland, e. Frey's syndrome is due to injury of auriculotemporal nerve

39. Ans. a. Parotid gland is the most common site of Lymphoepithelioma in the Head and Neck region (Ref: Devita 9/e p729, 752, 774)

- The most common site of lymphoepithelioma is the nasopharynx^Q. Lymphoepithelioma occurs rarely in the parotid and submandibular glands.

LYMPHOEPITHELIOMA

- Lymphoepithelioma: Undifferentiated carcinoma of the nasopharyngeal type
- Lymphoepithelioma is a variant of squamous cell carcinoma^Q that arises in lymphoid bearing areas
- Found most commonly in the nasopharynx^Q
- Rarely occur in parotid and submandibular glands^Q

Common sites of Lymphoepithelioma in Head and Neck

- Nasopharynx (MC site)^Q
- Faucial tonsils
- Lingual tonsils (base of tongue)

- Histologically the squamous component is highly undifferentiated while the lymphoid component is essentially benign (non-neoplastic lymphocytes)
- EBV is commonly linked when this tumor is located in the nasopharynx^Q
- High tendency to metastasize and is exquisitely radiosensitive^Q

Important characteristic features

- High tendency to metastasize^Q
- Extreme radiosensitivity^Q

40. Ans. c. Superficial parotidectomy (Ref: Bailey 26/e p733, 25/e p762; Devita 9/e p775-777; Cancer of the Head and Neck by Suen and Myer 4/e p494-501)

TREATMENT OF CHOICE FOR PLEOMORPHIC ADENOMA

- In parotid gland: superficial parotidectomy^Q
- In other salivary glands: excision of the affected gland^Q

TREATMENT OF SALIVARY GLAND TUMORS

- Surgery
 - Principal treatment of cancer of salivary glands is surgical excision, used either as a single modality or in most cases, in conjunction with adjuvant radiation therapy.

Parotid malignancies	<ul style="list-style-type: none"> Superficial parotidectomy^Q with preservation of facial nerve Total parotidectomy^Q with nerve preservation if deep lobe is involved
Other salivary glands	<ul style="list-style-type: none"> En-bloc excision^Q of tumor (involved gland)

- Neck dissection for lymph nodes: In clinically palpable nodes and High grade malignancies
- Radiotherapy

Indications of radiotherapy in Salivary Gland Tumors

- | | |
|---|--|
| <ul style="list-style-type: none"> High grade tumors^Q Large primary lesions^Q Perineural invasion^Q | <ul style="list-style-type: none"> Bone invasion^Q Cervical LN metastasis^Q Positive surgical margins^Q |
|---|--|

- No role of chemotherapy in salivary gland tumors due to incomplete and short lived response without any survival advantage.

41. Ans. d. Simple enucleation is treatment of choice

SALIVARY GLAND STONES

42. Ans. b. Submandibular (Ref: Bailey 26/e p732, 25/e p755)

SIALOLITHIASIS

- 80% of all salivary gland stones occur in submandibular gland^Q, 10% occur in parotid, 7% in sublingual and the remainder in minor salivary glands.

- MC site is Wharton's duct^Q submandibular gland substance

- **Composition of stone:** Calcium and magnesium phosphate or carbonate^Q
- Due to deposition of **calcium salts**, 80% stones are **radio opaque**^Q

Submandibular salivary gland calculi are more common than parotid because

- **Wharton's duct** has **long, curved and upward course** and is **hooked** by **lingual nerve** leading to **inadequate drainage**^Q
- Secretion is **more viscid**^Q than parotid gland secretion

Clinical Features

- **Pain and swelling**^Q of submandibular region, aggregated by food, classically by sucking a lemon
- **Stone impacted** in the **duct** may produce the referred **pain** in the **tongue** due to irritation of **lingual nerve**, as it hooks around the submandibular duct^Q

Treatment

- Stone in the duct is removed by giving **incision directly over the stone**^Q in long axis
- **Excision of submandibular gland**^Q when stone is in the gland substance

43. Ans. c. Acute parotitis (Ref: Bailey 25/e p755)

SIALOGRAPHY (PTYALOGRAPHY)

- Contrast X-ray examination of salivary glands and duct

Indications	Contraindications
<ul style="list-style-type: none"> • Salivary duct stones and strictures^Q • Chronic sialadenitis^Q • Tumors of salivary glands 	<ul style="list-style-type: none"> • Contrast allergy^Q • Acute sialadenitis^Q

44. Ans. c. Opening the duct and removal of calculus

45. Ans. b. Majority of submandibular stones are radioluscent

46. Ans. a. Sialography (Ref: Sutton's radiology 7/e p535, Bailey & Love 25/e p760)

47. Ans. c. 80%

48. Ans. d. marginal mandibular branch of facial nerve, lingual nerve & hypoglossal nerve

PAROTIDECTOMY AND COMPLICATIONS

49. Ans. c. Greater auricular nerve (Ref: Grays 40th/436; Bailey 26/e p734, 25/e p763-764)

- "Cross innervation between **somatic sensory supply** (greater auricular) and **parasympathetic secretomotor fibers** to the parotid is considered to be part of the anatomical basis for the phenomenon of **gustatory sweating** (**Frey's syndrome**) seen after parotid surgery, when the nerve is at risk of injury."

COMPLICATIONS OF PAROTIDECTOMY

- **Facial nerve paresis or paralysis**^Q
- **Frey's syndrome**^Q
- **Sensory abnormalities** associated with sacrifice of **greater auricular nerve**^Q
- **Salivary fistula**^Q

50. Ans. b. Temporal fascial graft (Ref: Bailey 25/e p763-764; Cancer of the Head and Neck by Suen and Myer 4/e p498)

FREY'S SYNDROME OR AURICULOTEMPORAL SYNDROME (GUSTATORY SWEATING)

- It results from **damage** of the **auriculotemporal**^Q nerve during dissection in parotidectomy
- **Aberrant cross innervations** between **secretomotor parasympathetic fibers** of the parotid gland and **sympathetic fibers** supplying the sweat gland^Q

Clinical Features

- **Sweating and erythema** over the region of the parotid glands as a consequence of autonomic stimulation of salivation by smell or taste of food.

Diagnosis

- **Minor's starch iodine test**^Q

Treatment

- **Antiperspirant** (aluminium chloride) application
- **Botulinum toxin** treatment is used for symptomatic **Frey's syndrome**
- **Surgical interruption** of secretory fibers by **tympanic neurectomy**, in non-responding cases

51. Ans. d. Frey's syndrome

52. Ans. a. In radical parotidectomy the facial nerve is preserved (Ref: Bailey 26/e p734, 25/e p763; Cancer of the Head and Neck by Suen and Myer 4/e p495)

- Radical parotidectomy: Facial nerve is sacrificed, particularly if there is a reasonable prospect of cure.

RADICAL PAROTIDECTOMY

- Radical parotidectomy involves resection of all parotid gland tissue and elective sectioning of facial nerve usually through the main trunk.

53. Ans. c. Redness and sweating over the auriculotemporal during meal

54. Ans. b. Facial

55. Ans. c. S-shaped

PAROTID FISTULA

56. Ans. a. Repair of parotid fistula

57. Ans. a. Parotid duct fistula (Ref: Cancer of the Head and Neck by Suen and Myer 4/e p498)

PAROTID FISTULA

- Internal fistula opens inside the mouth and doesn't give rise to symptoms
- External fistula: gland fistula or duct fistula

Causes

- Rupture of parotid abscess^Q
- Penetrating injury
- Inadvertent incision during drainage of parotid abscess^Q
- After superficial parotidectomy^Q

Clinical Presentation

- When the external fistula is connected to the gland, external opening is pinpoint, though discharge is present for several months, usually closes spontaneously.
- When external fistula is connected with major duct, there is outpouring of parotid secretions onto cheek during meals with excoriation of surrounding skin

Diagnosis

- Sialography or sialogram

Treatment

- Newman and Seabrock's operation^Q (in cases of fistula connected with main duct, this operation reconstructs the duct)

RANULA

58. Ans. c. Cystic swelling in the floor of mouth (Ref: Bailey 25/e p754)

RANULA

- A cystic swelling in the floor of mouth that resembles a frog belly^Q.
- Term ranula should only be applied to a mucous extravasation cyst that arises from the sublingual gland^Q

Etiology

- Commonly the lesion is induced by local trauma and duct rupture, followed by mucin spillage into the surrounding soft tissues (mucous extravasation phenomenon)^Q
- Uncommonly, it is due to obstruction, probably caused by mucous plug or a sialolith

Histopathology

- Mucin accumulation surrounded by granulation and fibrous tissue (mucous extravasation phenomenon)^Q
- A cyst cavity, filled with mucin and lined by the ductal epithelium (mucous retention cyst)^Q
- Chronic inflammation of the cyst wall is present. Infiltration by numerous neutrophils, histiocytes, and plasma cells are common^Q.

Clinical Features

- Exclusively present on the floor of mouth^Q
- Usually unilateral, lateral to midline^Q
- Smooth, dome shape, fluctuating and painless swelling^Q
- The color is usually bluish, but deep lesions may have a normal color.
- The size varies from a few to several centimeters in diameter. Very large lesions which may occupy the floor of mouth can also occur.

RANULA**Diagnosis**

- Diagnosis is usually made **clinically**^Q.

Treatment

- Surgical removal or marsupialization^Q.

PLUNGING RANULA

- Intraoral ranula with **cervical prolongation**^Q.
- Plunging ranula **extends from the floor of the mouth below the mylohyoid into the neck**.
- This is nearly always an **extravasation pseudocyst**.
- Presents as **soft painless, ballottable mass with cross fluctation**^Q.

59. Ans. c. Extravasation cyst of sublingual gland

60. Ans. d. None

61. Ans. d. Submandibular duct (Ref: *Clinical Surgery by Rob's and Smith vol-9/56*)

The **treatment of ranula** constitutes a problem, owing to technical **difficulty of complete excision without damage to adjacent structures such as submandibular duct**.

62. Ans. b. It is a cystic swelling in the floor of mouth

63. Ans. a. Cystic growth of sublingual gland

SALIVARY GLANDS ANATOMY AND PHYSIOLOGY

64. Ans. a. There are more than 400 minor glands, c. 90% of minor salivary glands are malignant, d. Superficial parotidectomy done in parotid tumors, e. Warthin's tumor common in parotid (Ref: *Bailey 26/e p723, 25/e p752*)

MINOR SALIVARY GLANDS

- The mucosa of the oral cavity contains approximately **450 minor salivary glands**^Q.
- They are distributed in the mucosa of the **lips, cheeks, palate, floor of the mouth and retromolar area**^Q.
- These minor salivary glands also appear in other areas of the **upper aerodigestive tract**^Q including the oropharynx, larynx and trachea as well as the sinuses.
- Overall, they **contribute to 10% of the total salivary volume**
- Their **secretion is mainly mucous**^Q in nature and has many functions such as coating the oral cavity with saliva.

65. Ans. b. Inferior belly of omohyoid (Ref: *Bailey 26/e p734, 25/e p763*)

MAJOR SURGICAL LANDMARKS TO THE FACIAL NERVE

- Tympanomastoid suture line (most constant landmark)^Q
- Tragal pointer^Q
- Posterior belly of digastric^Q
- Retromandibular vein^Q
- Styloid process^Q

66. Ans. b. Stenson's duct (Ref: *Bailey 26/e p723, 726, 729, 25/e p752-754; Cancer of the Head and Neck by Suen and Myer 4/e p495*)

SALIVARY GLANDS ANATOMICAL FEATURES

- Parotid gland: **Serous acini**^Q
- Submandibular gland: **Mucus + Serous acini**^Q
- Sublingual + minor salivary glands: **Mucinous acini**^Q

- Parotid gland: **Stenson's duct**^Q (opens at upper **2nd molar tooth**^Q)
- Submandibular gland: **Wharton's duct**^Q (opens into the papilla just **lateral to the frenulum**^Q)
- Sublingual gland: **Ducts of Rivinus**^Q, **Bartholin duct**^Q

- Sublingual gland secretes via tiny openings, **ducts of Rivinus** directly into the floor of mouth or via several ducts which unite to form the common **sublingual duct of Bartholin**, which then **merges with Wharton's duct**.

67. Ans. b. Lingual (Ref: *Bailey 26/e p726, 25/e p755*)

Lingual nerve lies in a close association with submandibular duct and most prone to damage during submandibular gland surgery.

SUBMANDIBULAR GLAND

- The **deep part** of the gland lies on the **hyoglossus muscle** closely related to the **lingual nerve** and inferior to the **hypoglossal nerve**^Q.
- **Submandibular duct** lies between the **lingual** and **hypoglossal nerves** on hyoglossus, but, at the **anterior border** of the muscle, it is **crossed laterally by the lingual nerve**^Q, terminal branches of which ascend on its medial side.

MANAGEMENT OF SIALOLITHIASIS

- If the **stone is lying within the submandibular duct** in the **floor of the mouth** anterior to the point at which the **duct crosses the lingual nerve** (second molar region), the **stone** can be **removed by incising longitudinally over the duct**^Q.
- Once the stone has been delivered, the wall of the duct should be left open to promote free drainage of saliva.
- Suturing the duct will lead to stricture formation and the recurrence of obstructive symptoms.
- Where the **stone is proximal to the lingual nerve**, i.e. at the hilum of the gland, **stone retrieval via an intraoral approach** should be **avoided** as there is a **high risk of damage to the lingual nerve**^Q during exploration in the posterior lingual gutter. **Treatment** is by **simultaneous submandibular gland excision and removal of the stone and ligation of the submandibular duct** under direct vision^Q.

68. Ans. d. Tonsillar fossa/bed (Ref: BDC 4/e pvol III/136, 217)

- Parotid gland is related to lateral pharyngeal wall. Tonsillar fossa is present in lateral pharyngeal wall.

69. Ans. b. Lingual

70. Ans. b. Facial nerve (Ref: Bailey 26/e p734, 25/e p758)

Structure exposed after parotid surgery is facial nerve.

- **Superficial parotidectomy:** The dissection is made in the Patey's facio-venous plane and commenced at the **postero-inferior border of the parotid gland**, where the **main trunk of the facial nerve is found out**^Q.

- **Radical parotidectomy:** Facial nerve is sacrificed, particularly if there is a reasonable prospect of cure^Q.

71. Ans. c. Inferior belly of Omohyoid

72. Ans. a. Inferior alveolar nerve (Ref: Bailey 25/e p755)

Important anatomical relationships of the submandibular glands	
<ul style="list-style-type: none"> • Lingual nerve^Q • Hypoglossal nerve^Q • Anterior facial vein^Q 	<ul style="list-style-type: none"> • Facial artery^Q • Marginal mandibular branch of the facial nerve

73. Ans. c. Angle of mandible (Ref: Bailey 26/e p726, 25/e p755)

ECTOPIC/ABERRANT SALIVARY GLAND TISSUE

- MC ectopic salivary tissue is the Stafne bone cyst.
- This presents as an **asymptomatic, clearly demarcated radiolucency** of the **angle of the mandible**, characteristically **below the inferior dental neurovascular bundle**^Q.
- It is formed by **invagination into the bone** on the lingual aspect of the mandible of an **ectopic lobe** of the juxtaposed **submandibular gland**^Q.
- **No treatment** is required^Q.

74. Ans. a. Hypoglossal, c. Facial, d. Lingual

SJOGREN'S SYNDROME

75. Ans. b. Males are commonly affected (Ref: Robbins 8/e p222; Bailey 26/e p737, 25/e p766; Harrison 18/e p2770-2772)

SJÖGREN SYNDROME

- Chronic disease characterized by **dry eyes (keratoconjunctivitis sicca)** and **dry mouth (xerostomia)** resulting from **immunologically mediated destruction** of the **lacrimal and salivary glands**^Q.
- It occurs as an **isolated disorder (primary form)**, also known as the **sicca syndrome** or more often **in association with another autoimmune disease (secondary form)**^Q.
- **Rheumatoid arthritis** is the MC associated disorder^Q

Pathology

- Characterized by **lymphocytic infiltration** and **fibrosis** of the **lacrimal** and **salivary glands**^Q.
- **Earliest histologic finding** in both the major and minor salivary glands is **periductal** and **perivascular lymphocytic infiltration**^Q.

- **Most important antibodies:** Directed against **SS-A (Ro)** and **SS-B (La)**^Q, which can be detected in 90% of patients (**serologic markers**^Q of the disease)
- Patients with **high titers of antibodies to SS-A** are **more likely to have early disease onset, longer disease duration, and extraglandular manifestations**^Q.

Clinical Features

- Occurs **most commonly in women**^Q between the ages of **50** and **60**.
- **Characteristic symptoms:** **Keratoconjunctivitis** and **xerostomia**^Q
- **Parotid gland enlargement** is present in **half of the patients**^Q
- **Extraglandular disease** are seen in **one third** of patients

Diagnosis

- **Biopsy of the lip** (to examine minor salivary glands) is **essential** for the **diagnosis of Sjögren syndrome**^Q.

76. Ans. a. Parotid glands

77. Ans. b. Lymphocytes

MISCELLANEOUS

78. Ans. c. Debilitation after major surgery (Ref: Bailey 26/e p730, 25/e p759-760)

ACUTE SUPPURATIVE PAROTITIS

- Characterized by **presence of pus** and seen in **debilitated/ dehydrated/ or in patients with poor oral hygiene**^Q.
- **MC organism** (responsible for): **Staph. aureus**^Q

Treatment

- Initial treatment is **proper hydration/ antibiotics/ improving oral hygiene**^Q.
- If **abscess** develops then it is **drained**^Q by giving a J shaped incision.

79. Ans. c. SLE (Ref: Harrison 18/e p2108)

Causes of Bilateral Parotid Enlargement

- | | |
|---|--|
| <ul style="list-style-type: none"> • Viral infections: <ul style="list-style-type: none"> – Mumps^Q – Influenza – Epstein-Barr virus^Q – Coxsackie virus A^Q – Cytomegalovirus^Q – HIV^Q • Sarcoidosis^Q • Amyloidosis^Q • Kimura's disease | <ul style="list-style-type: none"> • Wagner's Granulomatosis • Sjögren's syndrome^Q • Metabolic: <ul style="list-style-type: none"> – Diabetes mellitus^Q – Hyperlipoproteinemias – Chronic pancreatitis^Q – Hepatic cirrhosis^Q • Endocrine: <ul style="list-style-type: none"> – Acromegaly^Q – Gonadal hypofunction |
|---|--|

80. Ans. b. Debilitation after major surgery

81. Ans. c. Non-inflammatory parotid enlargement (Ref: Bailey 25/e p766)

SIALOSIS

- **Sialosis** is an uncommon **non-neoplastic** and **non-inflammatory disorder** causing **bilateral non-painful enlargement** of the **major salivary glands**^Q.

82. Ans. c. Squamous cell carcinoma (Ref: Oxford textbook of oncology, Vol. I/1995/1046)

Ackerman's tumour is a distinct variant of well-differentiated squamous cell carcinoma.

ACKERMAN'S TUMOUR

- Ackerman's tumour is a **distinct variant** of **well-differentiated SCC** that may develop in **any mucosal surface in the upper respiratory and digestive tract**^Q.
- It is also called as **verruccous carcinoma**^Q.

- **Most verrucous carcinoma** are reported within the **oral cavity**^Q but they make up 1-2% of malignant laryngeal tumours within the larynx.
- Verrucous carcinomas occur **mainly in the elderly patients**^Q.
- Verrucous carcinomas may be **multifocal** and **warty** in their **appearance**^Q.

- The **pushing infiltrating margins** are characteristic of verrucous carcinomas.
- Lymphatic spread is rare.

Risk Factors for Verrucous Carcinoma

- Frequent use of **tobacco (MC)**^Q
- **HPV infection**^Q

Histology

- Well-differentiated, keratinising epithelium, with few mitotic figures and no cellular atypia.

Treatment

- **Surgery** is the **treatment of choice**.

83. **Ans. d. All of the above**

Lazy 's'/Modified Blairs/Sistrunk incision

MULTIPLE CHOICE QUESTIONS

CAROTID BODY TUMOR

1. True about carotid body tumour is: (UPPG 2010)
 - a. Origin from non chromaffin tissue
 - b. Most commonly is seen with people live at high altitude
 - c. Family history positive
 - d. FNAC is diagnostic
 - e. Painful non mobile lump in the neck
2. A 40-years old patient is suffering from carotid body tumor. Which of the following is the best choice of treatment for him? (AIIMS Nov 2004)
 - a. Excision of tumor
 - b. Radiotherapy
 - c. Chemotherapy
 - d. Carotid artery ligation both proximal and distal to the tumor
3. True about carotid body tumor: (PGI June 2004)
 - a. Arises from pharyngeal wall
 - b. Arises from baroreceptor cells
 - c. Commonly seen in high altitude habitants
 - d. 10% have family history
 - e. FNAC is diagnostic
4. True statement about carotid body tumor is: (PGI June 2002)
 - a. Non-chromaffin paraganglioma
 - b. Good prognosis
 - c. Rarely metastasizes
 - d. Similar to mixed parotid tumor
5. Carotid body tumour: (PGI Dec 2005)
 - a. Arises from the endothelial cells
 - b. Originates from the schwann cells
 - c. Radiotherapy is the treatment of choice
 - d. May metastasize
6. True about carotid body tumour is: (DPG 2006)
 - a. Arises from schwann cell
 - b. Causes hypertension
 - c. Arises from endothelial cell
 - d. None of the above
7. Main problem associated with carotid body tumor operation is: (MHPGMCET 2001)
 - a. The tumor blends with jugular vein
 - b. The tumor blends with bifurcation of carotid artery
 - c. Recurrence
 - d. Vasovagal shock
8. Which one is not true regarding carotid body tumour? (AIIMS June 97)
 - a. Unilateral
 - b. Surgical resection is the treatment
 - c. Non-chromaffin paraganglioma
 - d. Middle age group is affected

9. Carotid body tumor most commonly presents at:

(Recent Question 2015)

- | | |
|----------------|--------------------|
| a. 20-30 years | b. 40-50 years |
| c. 60-70 years | d. Early childhood |

CYSTIC HYGROMA

10. Cystic hygroma may be associated with: (MCI March 2005)

a. Turner's syndrome	b. Klinefelter's syndrome
c. Down's syndrome	d. All of the above
11. Brilliantly translucent swelling in the neck region in a 2 years child diagnosis is: (UPPG 2009)

a. Lipoma	b. Teratoma
c. Cystic hygroma	d. Thyroglossal cyst
12. Which is incorrect about cystic hygroma? (APPG 2008)
 - a. Brilliantly translucent
 - b. Radiotherapy
 - c. Sclerotherapy with bleomycin
 - d. Sclerotherapy with actinomycin
13. All are true about cystic hygroma except: (AMU 95, DPG 2010)
 - a. Pulsatile
 - b. May cause respiratory obstruction
 - c. Common in neck
 - d. Present in birth
14. True about cystic hygroma: (DPG 2008)
 - a. Present in anterior triangle of neck
 - b. Sclerosing agents are not useful
 - c. Pre-operative MRI is crucial
 - d. Surgery is always indicated
15. Treatment of cystic hygroma includes: (PGI May 2011)
 - a. Complete excision
 - b. Marsupialization
 - c. Repeated aspiration
 - d. Injection of sclerosing agents
 - e. Observation or regular follow up
16. Cystic hygroma is known to occur in all except: (Karnataka 2005, MHPGMCET 2002)

a. Calf	b. Neck
c. Axilla	d. Mediastinum
17. Treatment of choice for cystic hygroma: (DNB 2013, MHPGMCET 2007)
 - a. Percutaneous aspiration
 - b. Intralesional sclerosant injection
 - c. En-bloc resection
 - d. Surgical excision

18. Which of the following is false regarding cystic hygroma? (MHPGMCET 2008)
 a. Brilliantly translucent lesion
 b. Surgical excision is treatment of choice
 c. Recurrence is common with percutaneous Picibanil therapy
 d. A cystic lesion containing blood filled spaces
19. True regarding cystic hygroma is: (AIIMS Nov 93)
 a. Non transilluminant
 b. Lined by columnar epithelium
 c. Lined by stratified squamous epithelium
 d. Develops from jugular lymphatic sequestration
20. All are true about cystic hygroma except: (Punjab 2009, PGI Dec 99)
 a. Aspiration is diagnostic
 b. 50% present at birth
 c. Presents as posterior cervical swelling
 d. Sequestration of lymphatic tissue
21. True about cystic hygroma: (PGI Dec 2000)
 a. Congenital sequestration of lymphatics
 b. Resolves spontaneously by 5 years of age
 c. Common in upper 1/3rd of lateral neck
 d. Surgery is the treatment of choice
22. Cystic compressible, translucent swelling in the posterior triangle of neck: (DNB 2008, All India 89)
 a. Cystic hygroma
 b. Branchial cyst
 c. Thyroglossal cyst
 d. Dermoid cyst
23. Cystic hygroma: (SCTIMS 98)
 a. Should be left alone
 b. Excision of cyst at an early age
 c. Spontaneous regression
 d. Manifests in 2nd - 3rd decade
24. Earliest tumour to appear after birth is: (JIPMER 87)
 a. Sternomastoid tumour
 b. Cystic hygroma
 c. Branchial cyst
 d. Lymphoma
25. The following are examples of Retention cysts due to blockade of excretory duct except one which is an example of Distension cyst due to exudation. Which is the one? (APPG 2016)
 a. Cystic hygroma
 b. Sebaceous cyst
 c. Bartholin's cyst
 d. Ranula

BRANCHIAL CYST AND FISTULA

26. True about branchial cyst: (PGI Nov 2011)
 a. Arise from lower third of sternocleidomastoid
 b. Peak age of presentation is 3rd decade
 c. Cyst wall consists of lymphoid tissue
 d. Fluid contains cholesterol crystal
 e. Lined by squamous epithelium
27. Most frequent site of branchial cyst is at: (MHSSMCET 2005)
 a. Upper third of posterior border of Sternocleidomastoid
 b. Lower third of anterior border of Sternocleidomastoid
 c. Upper third of anteromedial border of Sternocleidomastoid
 d. Supraclavicular fossa
28. True about branchial anomaly: (AIIMS Nov 2006)
 a. Cysts are more common than sinuses
 b. For sinuses surgery is not always indicated
 c. Cysts present with dysphagia and hoarseness of voice
 d. Most commonly due to 2nd branchial remnant
29. True about branchial cyst: (PGI June 2007)
 a. Seen deep to lower 1/3rd of sternocleidomastoid
 b. Wall consists of lymphoid tissue
 c. Filled with straw colored fluid with cholesterol crystals
 d. Presents at birth
30. What is true about branchial cyst? (DPG 2007)
 a. Present in anterior triangle of neck
 b. Cauterization is done
 c. Arises from 2nd cleft
 d. Present in lower 3rd of neck
31. Branchial cyst arises from which branchial cleft? (MCI Sept 2009)
 a. First
 b. Second
 c. Third
 d. Fourth
32. The commonest site of branchial cysts is: (All India 94)
 a. Upper 1/3rd of the SCM
 b. Lower 1/3rd of the SCM
 c. Upper 2/3rd of the SCM
 d. Lower 2/3rd of the SCM
33. The most common site of the internal opening of a branchial fistula is at the: (UPSC 95)
 a. Lateral nasopharyngeal wall
 b. Fossa of Rosenmuller
 c. Gingivo-labial sulcus
 d. Tonsillar fossa
34. Commonest treatment of branchial cyst: (HPU 2005)
 a. Cystectomy
 b. Aspiration
 c. Excision
 d. Nothing done

THYROGLOSSAL CYST AND FISTULA

35. Excision of the hyoid bone is done in: (HPU 2005)
 a. Branchial cyst
 b. Branchial fistula
 c. Thyroglossal cyst
 d. Sublingual dermoids
36. Which is never a cause of thyroglossal fistula? (PGI 81, AIIMS 85)
 a. Infection of thyroglossal cyst
 b. Inadequate removal of thyroglossal cyst
 c. Congenital
 d. None of the above
37. Thyroglossal fistula develops due to: (Kerala 91)
 a. Developmental anomaly
 b. Injury
 c. Incomplete removal of thyroglossal cyst
 d. Inflammatory disorder

CERVICAL RIB

38. Regarding cervical rib, which statement is correct? (AIIMS 81, PGI 82)
 a. It always connects to the scalene tubercle by a fibrous band
 b. It passes through the apex of the supraclavicular triangle
 c. It causes pressure on the ulnar nerve
 d. Pain is often located in the forearm
39. Adson's test is positive in: (Kerala 89)
 a. Cervical rib
 b. Cervical spondylosis
 c. Cervical fracture
 d. Cervical dislocation

NECK DISSECTION

40. Structures not removed in radical neck dissection: (PGI June 2007)
 a. X nerve
 b. XI nerve
 c. Tail of parotid
 d. Parotid and post-auricular nerve
41. Structures preserved in radical neck dissection is: (All India 2000)
 a. Vagus nerve
 b. Submandibular gland
 c. Sternocleidomastoid
 d. Internal Jugular Vein

42. Which structure is preserved during modified radical neck dissection? (DNB 2004)

- a. Phrenic nerve b. Submandibular gland
- c. Sternocleidomastoid d. Thoracic duct

43. In Post radical neck dissection shoulder syndrome, all are seen except: (AIIMS Nov 2008)

- a. Restricted range of movement
- b. Pain
- c. Shoulder drooping
- d. Normal electromyographic finding

44. Modified radical dissection of neck all structures are preserved except: (UPPG 2010)

- a. Sternomastoid b. External jugular vein
- c. Internal jugular d. Spinal accessory

45. Level V cervical nodes includes: (MCI Sept 2007)

- a. Upper jugular nodes b. Middle jugular nodes
- c. Lower jugular nodes d. Posterior triangle nodes

46. In radical neck dissection, which structure is not removed?

- a. Cervical group of lymph nodes (MCI March 2005)
- b. Sternocleidomastoid muscle
- c. Internal jugular vein
- d. None of the above

47. Radical neck dissection included all except: (MHSSMCET 2005)

- a. Sternocleidomastoid b. Accessory nerve
- c. Level III lymph nodes d. Jugular vein

48. Posterior triangle LN is what level? (MHSSMCET 2009)

- a. Level I b. Level II
- c. Level V d. Level IV

49. In extended supraomohyoid neck dissection, lymph node dissection is done upto: (MHSSMCET 2010)

- a. 2 b. 3
- c. 4 d. 5

50. Structures preserved in modified radical neck dissection: (PGI May 2011)

- a. Accessory nerve
- b. Sternocleidomastoid muscle
- c. Submandibular gland
- d. Internal jugular vein
- e. Omohyoid muscle

51. Structures not removed in functional neck dissection is: (AIIMS Nov 93)

- a. Carotid artery, vagus nerve
- b. Sternomastoid muscle, internal jugular vein
- c. Spinal accessory nerve, submandibular salivary gland
- d. Neck nodes

52. Structures preserved in functional radical dissection of the neck: (AIIMS 87)

- a. Internal jugular vein b. Sternomastoid
- c. Lymph nodes d. Accessory nerve

53. Radical dissection of neck includes all except: (JIPMER 80, DPG 89)

- a. Cervical lymph nodes
- b. Sternocleidomastoid
- c. Phrenic nerves
- d. Internal jugular vein

54. A nerve injured in radical neck dissection leads to loss of sensation in medial side of the arm, nerve injured is: (DNB 2014)

- a. Long thoracic nerve
- b. Thoracodorsal nerve
- c. Dorsal scapular nerve
- d. Medial cutaneous nerve of arm

55. In MRND type-II, structures preserved are: (MHCET 2016)

- a. Spinal accessory nerve + SCM
- b. Spinal accessory nerve + internal jugular vein
- c. SCM + internal Jugular vein
- d. Level I-V LN + SCM

CA LARYNX

56. Precancerous lesion of the larynx include: (PGI 87)

- a. Keratosis laryngis b. Pachydermia laryngis
- c. Laryngis sicca d. Scleroma

CA NASOPHARYNX

57. Trotters triad is seen in: (PGI 85)

- a. Angiofibroma
- b. Nasopharyngeal carcinoma
- c. Laryngeal carcinoma
- d. Growth in fossa of Rosenmuller

58. Which of the following is the most common tumour to produce metastasis to cervical lymph nodes? (UPSC 2008)

- a. Glottic carcinoma
- b. Nasopharyngeal carcinoma
- c. Carcinoma base of tongue
- d. Carcinoma lip

59. Secondaries in the neck with no obvious primary malignancy is most often due to: (JIPMER 93)

- a. CA Stomach b. CA Larynx
- c. CA Nasopharynx d. CA Thyroid

MISCELLANEOUS

60. True about superior sulcus tumor: (DPG 2007)

- a. Anhidrosis in thoracic region
- b. Pain in upper aspect of arm
- c. Flexor atrophy
- d. 2nd and 3rd rib erosion

61. In which of the following head and neck cancers, is lymph node metastasis least common? (AIIMS May 2008)

- a. Tongue
- b. Buccal mucosa
- c. Hard palate
- d. Lower alveolus

62. Blow out carotid is characteristically seen with: (AIIMS Nov 98)

- a. Thyroidectomy
- b. Radical neck dissection
- c. Flap necrosis
- d. Sistrunk operation

63. Which of the following does not move on deglutition? (All India 91)

- a. Sublingual dermoid
- b. Thyroid nodule
- c. Pretracheal lymph node
- d. Thyroglossal cyst

64. An elderly male presents with 4 × 5 cm lump in right neck. FNAC revealed it to be squamous cell carcinoma. No primary was found. A diagnosis of unknown primary was made. According to AJCC system or classification, the TNM staging of tumour would be: (JIPMER 2014, AIIMS May 2013)

- a. T1N2M0 b. T0N2aM1
- c. T1N2cM0 d. T0N2aMx

EXPLANATIONS

CAROTID BODY TUMOR

1. b. Most commonly is seen with people live at high altitude; c. Family history positive (Ref: Sabiston 19/e p814-815; Schwartz 10/e 678, 849, 9/e p721-723; Bailey 26/e p704, 25/e p732; Devita 9/e p772-773)

CAROTID BODY TUMOR (CHEMODECTOMA)

- Arises from the **chemoreceptor cells**^Q on the **medial side** of carotid bulb
- Histologically it is a **non-chromaffin paraganglioma**^Q
- Usually **benign, unifocal** and **nonhereditary**, **Schamblin classification** is used for **carotid body tumour**
- Associated with **pheochromocytoma**^Q
 - **Higher incidence** in areas where **people live at high altitudes** because of **chronic hypoxia** leading to **carotid body hyperplasia**.

Clinical features

- Present most commonly in the **5th decade**^Q
- Approximately **10%** have **family history**^Q.
- Patient presents with a **long history** of several years of a **slowly enlarging painless lump** at the **carotid bifurcation**.
- Mass is **firm, rubbery, pulsatile** and is **mobile from side to side** but not up and down
- A **bruit**^Q may also be present

Diagnosis

- Doppler study
- **Carotid angiogram**: **Lyre sign**^Q (splaying of the **internal** and **external** carotid arteries)
- **FNAC** and **biopsy** are **contraindicated**^Q because of their **highly vascular nature**

Treatment

- Because these tumors **rarely metastasize**^Q and their **overall rate of growth** is **slow**, the need for **surgical removal** must be **considered carefully** as complication of surgery are potentially serious.
- **Operation is best avoided in elderly patients**^Q.
- **Preoperative embolization** is performed for tumors **>3 cm**.
- Tumors **>5 cm** are associated with a need for **concurrent carotid artery replacement**.

Complications

- Most frequent sequela from resection: **Cranial nerve injury** (MC-superior laryngeal nerve^Q)
- **First-bite syndrome**^Q: Pain with the **initiation of mastication**
- **Excision of bilateral carotid body tumors** may lead to **baroreceptor failure**, with **wide fluctuations in BP**.

2. Ans. a. Excision of tumor
3. Ans. c. Commonly seen in high altitude habitants; d. 10% have family history
4. Ans. a. Non-chromaffin paraganglioma; b. Good prognosis; c. Rarely metastasizes
5. Ans. d. May metastasize
6. Ans. d. None of the above
7. Ans. b. The tumor blends with bifurcation of carotid artery
8. Ans. None
9. Ans. b. 40-50 years

CYSTIC HYGROMA

10. Ans. a. Turner's syndrome (Ref: Sabiston 19/e p1819; Schwartz 10/e 598, 1852, 9/e p1415; Bailey 26/e p701, 25/e p729)

CYSTIC HYGROMA

- Cystic hygromas are **multiloculated cystic spaces**^Q lined by endothelial cells
- It results due to **sequestration** of a portion of the **jugular lymph sac** from the **lymphatic system**^Q.
- **Cysts** are filled with **clear lymph** and are lined by **endothelium**^Q.
- **Turner's syndrome** is associated with cystic hygroma^Q.
- Most cystic hygromas involve the **lymphatic jugular sacs**

CYSTIC HYGROMA

- MC site: Posterior neck region^Q
- Other common sites: Axilla, mediastinum, inguinal and retroperitoneal regions^Q
- Approximately 50% of them present at birth^Q
- It may show spontaneous regression^Q

Clinical Features

- Usually present as soft cystic masses that distort the surrounding anatomy, can result in acute airway obstruction.
- Usually manifests in the neonates or in early infancy^Q (50% present at birth).
- Prone to infection and hemorrhage within the mass.
- Swelling is soft and partially compressible and invariably increases in size when the child coughs or cries.

- Characteristic features: Brilliantly translucent^Q

Diagnosis

- MRI play a crucial role in preoperative planning^Q

Treatment

- Complete surgical excision is the preferred treatment^Q.
- Injection of sclerosing agents^Q such as bleomycin or OK-432 (Picibanil), derived from *Streptococcus pyogenes* may eradicate the cystic hygroma.

11. Ans. c. Cystic hygroma
12. Ans. b. Radiotherapy
13. Ans. a. Pulsatile
14. Ans. c. Pre-operative MRI is crucial
15. Ans. a. Complete excision, d. Injection of sclerosing agents
16. Ans. a. Calf
17. Ans. d. Surgical excision
18. Ans. d. A cystic lesion containing blood filled spaces
19. Ans. d. Develops from jugular lymphatic sequestration
20. Ans. a. Aspiration is diagnostic
21. Ans. a. Congenital sequestration of lymphatics, d. Surgery is the treatment of choice
22. Ans. a. Cystic hygroma
23. Ans. b. Excision of cyst at an early age
24. Ans. b. Cystic hygroma
25. Ans. a. Cystic hygroma

BRANCHIAL CYST AND FISTULA

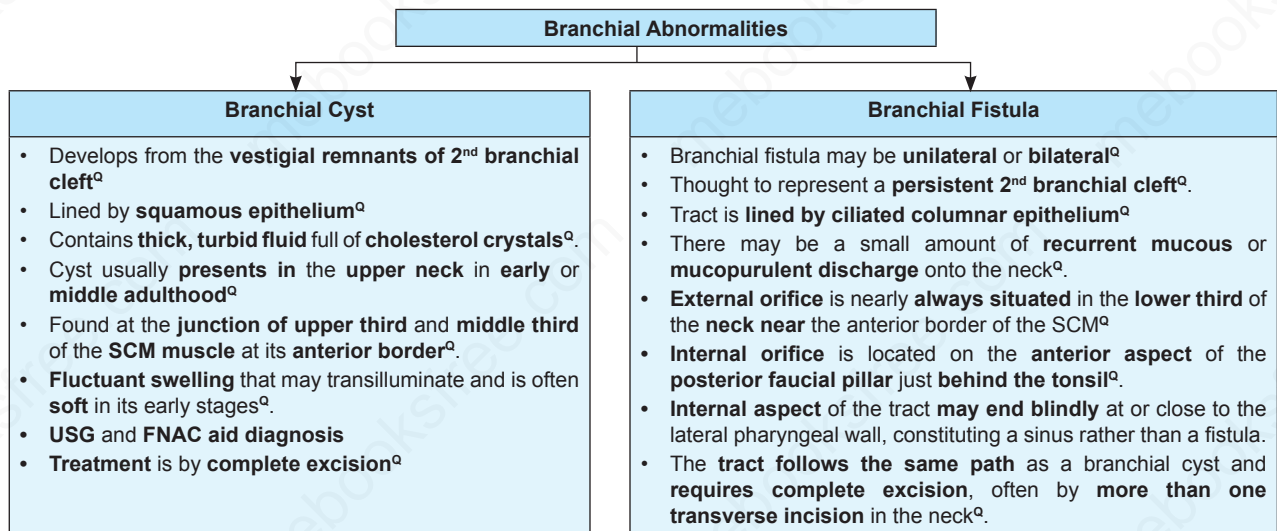
26. Ans. b. Peak age of presentation is 3rd decade; c. Cyst wall consists of lymphoid tissue; d. Fluid contains cholesterol crystal; e. Lined by squamous epithelium (Ref: Sabiston 19/e p834; Schwartz 10/e 1602,598,1602, 9/e p1414-1415; Bailey 26/e p700-701, 25/e p727-729)

BRANCHIAL CLEFT REMNANTS

- Branchial cleft remnants typically present as a lateral neck mass^Q on a toddler.
- Structures of the head and neck are derived from 6 pairs of branchial arches, their intervening clefts and pouches.
- Congenital cysts, sinuses, or fistulas result from failure of these structures to regress, persisting in an aberrant location.

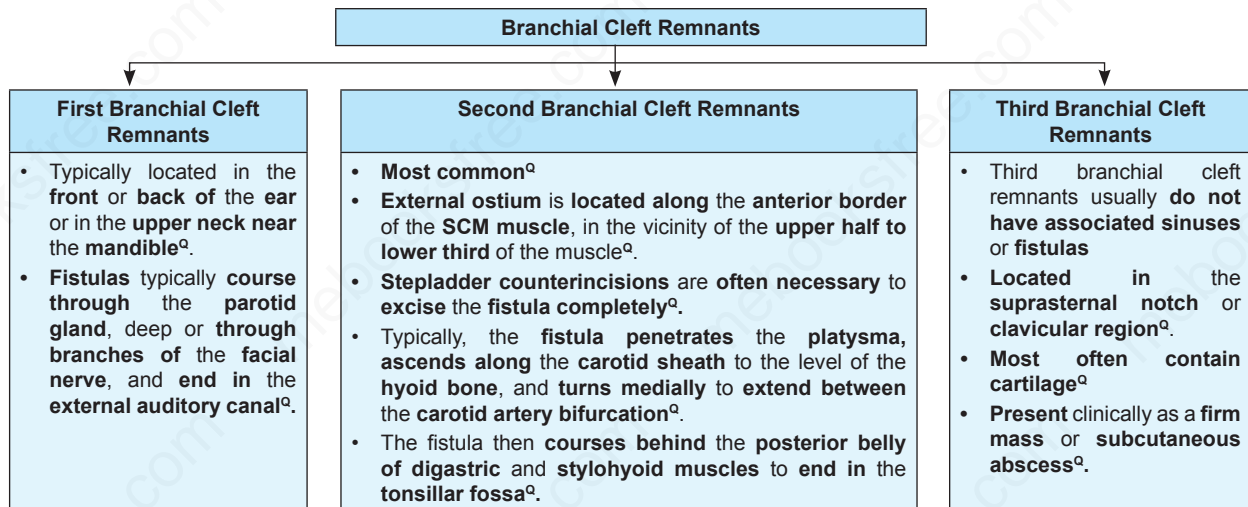
- All branchial remnants are present at the time of birth; however, they are often not recognized until later in life.
- These lesions may present as sinuses, fistulas, or cartilaginous rests in infants^Q.
- They occur more commonly as cysts in older children and adolescents^Q.

- Clinical presentation may range from a continuous mucoid drainage from a fistula or sinus to the development of a cystic mass^Q that may become infected.
- Branchial remnants may also be palpable as cartilaginous lumps or cords^Q corresponding with a fistulous tract. Dermal pits or skin tags may also be evident.



27. Ans. c. Upper third of anteromedial border of Sternocleidomastoid

28. Ans. d. Most commonly due to 2nd branchial remnant (Ref: Sabiston 19/e p834; Schwartz 10/e 1602,598,1602, 9/e p1414-1415; Bailey 26/e p700-701, 25/e p727-729)



29. Ans. b. Wall consists of lymphoid tissue; c. Filled with straw colored fluid with cholesterol crystals

30. Ans. c. Arises from 2nd cleft

31. Ans. b. Second

32. Ans. a. Upper 1/3rd of the SCM

33. Ans. d. Tonsillar fossa

34. Ans. c. Excision

THYROGLOSSAL CYST AND FISTULA

35. Ans. c. Thyroglossal cyst

36. Ans. c. Congenital (Ref: Sabiston 19/e p814; Schwartz 10/e 1521,598,1521-1522,1602, 9/e p1414; Bailey 25/e p730)

THYROGLOSSAL FISTULA

- A thyroglossal fistula usually presents as **discharging sinus** in the **midline**^Q of the neck in the line of thyroid descent.
- It is **never congenital** but follows **infection** or **inadequate removal** of a **thyroglossal cyst**^Q
- Acquired condition**^Q

Clinical Features

- Presentation is with a **fistulous opening** **near to the midline** of the **neck**^Q
- The fistula may become **infected** and **discharge pus**^Q

Treatment

- The fistula should be excised along with the thyroglossal tract upto the base of the tongue.
- This requires removing the central (middle one third) of the hyoid bone^Q.

37. Ans. c. Incomplete removal of thyroglossal cyst

CERVICAL RIB

38. Ans. c. It causes pressure on the ulnar nerve; d. Pain is often located in the forearm (Ref: Sabiston 19/e p1595; Bailey 26/e p872, 25/e p895)

CERVICAL RIB

- This rib is usually represented by a fibrous band originating from the 7th cervical vertebra and inserting onto the 1st thoracic rib^Q.
- It may be asymptomatic, but because the subclavian artery and brachial plexus course over it a variety of symptoms may occur.
 - The lower trunk of the plexus (mainly T1) is compressed, leading to wasting of the interossei and altered sensation in the T1 distribution^Q.
 - Pain, paraesthesia and numbness is often located in the forearm in the region of ulnar nerve distribution^Q.
- Compression of the subclavian artery may result in a post-stenotic dilatation with thrombus and embolus formation^Q.

39. Ans. a. Cervical rib

NECK DISSECTION

40. Ans. a. X nerve; c. Tail of parotid; d. Parotid and post-auricular nerve (Ref: Sabiston 19/e p796-797; Schwartz 9/e p503-505; Bailey 26/e p720, 25/e p748-749; Cancer of the Head and Neck by Suen and Myer 4/e p416-418)

Radical Neck Dissection	Modified Radical Neck Dissection
<ul style="list-style-type: none"> • Removal of lymph nodes I-V + spinal accessory nerve + internal jugular vein + sternocleidomastoid muscle^Q 	<ul style="list-style-type: none"> • Removal of level I-V lymph nodes with (Mnemonic: SISm): <ul style="list-style-type: none"> - Type I: preserves only spinal accessory nerve^Q - Type II: preserves both spinal accessory nerve and internal jugular vein^Q - Type III: preserves spinal accessory nerve, internal jugular vein and sternocleidomastoid muscle^Q

41. Ans. a. Vagus nerve

42. Ans. c. Sternocleidomastoid

43. Ans. d. Normal electromyographic finding (Ref: Surgical Management of Neck Metastasis by Jack L Gluckman, Jonas T Johnson/53)

SHOULDER SYNDROME

- In radical neck dissection, the most crippling complication is the "Shoulder syndrome" arising from denervation and atrophy of the trapezius muscle due to sacrifice of the spinal accessory nerve^Q.

Shoulder syndrome is characterized by

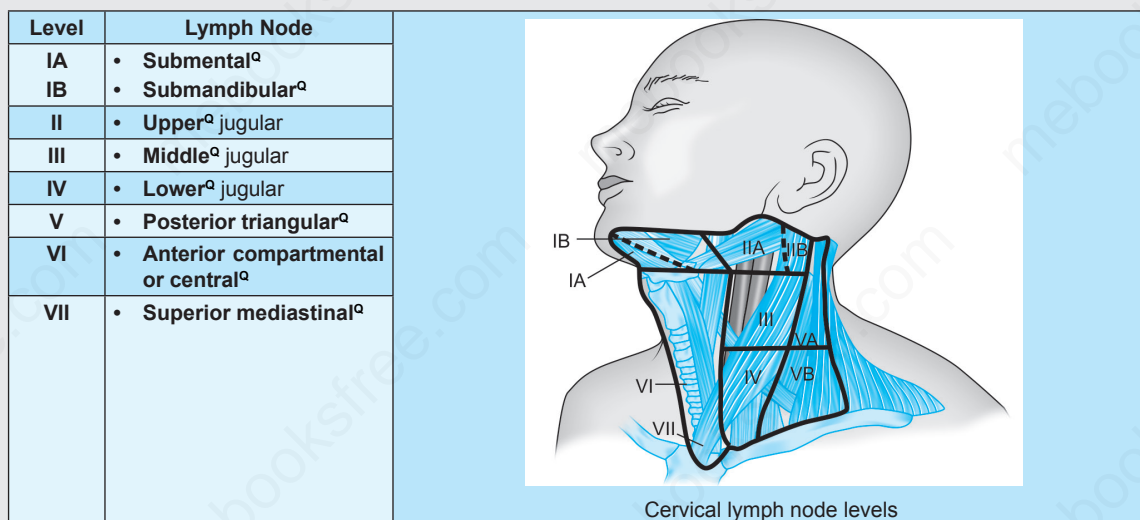
- Inability to abduct the shoulder beyond 90° cephalad^Q
- Long standing pain in the shoulder^Q
- Deformity of the shoulder girdle (drooping of the shoulder with abduction and external rotation)^Q

44. Ans. b. External jugular vein

45. Ans. d. Posterior triangle nodes (Ref: Sabiston 19/e p796-797; Schwartz 10/e p595-597, 9/e p503; Bailey 25/e p738)

CERVICAL LYMPH NODES

- Cervical lymphatic nodal basins contain 50-70 lymph nodes per side
- Virchow or left supraclavicular nodes are included in level IV^Q.
- Divided into seven levels

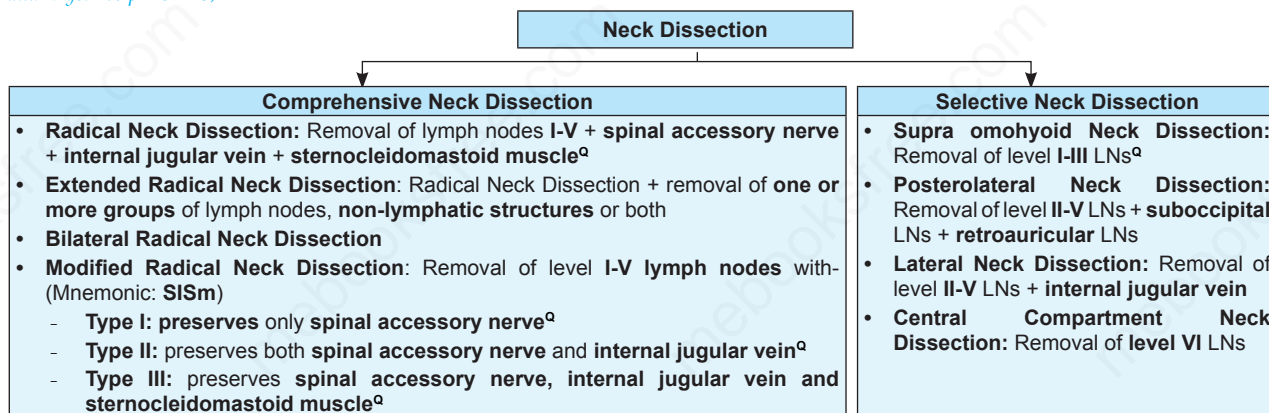


46. Ans. d. None of the above

47. Ans. None

48. Ans. c. Level V

49. Ans. c. 4 (Ref: Sabiston 19/e p796-797; Schwartz 10/e p595, 9/e p503-505; Bailey 26/e p720, 25/e p748-749; Cancer of the Head and Neck by Suen and Myer 4/e p416-418)



50. Ans. a. Accessory nerve; b. Sternocleidomastoid muscle; d. Internal jugular vein

51. Ans. a. Carotid artery, vagus nerve; b. Sternomastoid muscle, internal jugular vein

52. Ans. a. Internal jugular vein; b. Sternomastoid; d. Accessory nerve

53. Ans. c. Phrenic nerves

54. Ans. d. Medial cutaneous nerve of arm (Ref: Bailey 25/e p733)

55. Ans. b. Spinal accessory nerve + internal jugular vein

CA LARYNX

56. Ans. a. Keratosis laryngis; b. Pachydermia laryngis (Ref: Schwartz 10/e p589-591, 9/e p498; Scott-Brown 5/e p106)

- **Localized area of thickening** of the epithelium which appear as **single or multiple chalky white elevations** on the upper surface and edge of one or both the cords usually with **involvement of the membranous portion** are not uncommon.
- These have been designated as **keratosis**, hyperkeratosis, leukoplakia, **pachydermia laryngis** or by other terms by laryngologist and pathologist.
- **Laryngeal keratosis or pachydermia laryngis** is a precursor of laryngeal cancer that bears great similarity to oral leukoplakia^Q.

CARCINOMA LARYNX

- More common in **males^Q**, seen in **40-70 years^Q**
- **Tobacco^Q** and **alcohol^Q** are well established risk factor
- **Cigarette smoke:** Benzopyrene and hydrocarbons are carcinogenic in man.
- About **90-95%** of laryngeal malignancies are **squamous cell carcinoma^Q** with various grades of differentiation.
- **Cordal lesions** are often **well-differentiated^Q** while **supraglottic ones** are **Anaplastic**.

Carcinoma Larynx		
Supraglottic Cancer	Glottic Cancer	Subglottic Cancer
<ul style="list-style-type: none"> Supraglottic cancer is less frequent than glottic cancer^Q. Nodal metastases occur early^Q, upper and middle jugular nodes are often involved. Bilateral metastases may be seen in cases of epiglottic cancer. Pain on swallowing is the most frequent initial symptom^Q. Mass in the neck may be the first sign. Hoarseness is a late symptom. Pain may be referred to ear by way of vagus nerve and auricular nerve of Arnold^Q. 	<ul style="list-style-type: none"> MC site of CA Larynx^Q. Mostly originates from free edge and upper surface of anterior 1/3rd of true vocal cord^Q followed by middle third 1/3rd. Spread locally to anterior commissure than to opposite cord (conus elasticus initially acts as barrier for subglottic spread^Q). Fixation of vocal cord indicates spread of disease to thyroaretenoid muscle and is a bad prognostic sign^Q. As vocal cord is free of lymphatics, nodal metastases is never seen in cordal cancer^Q, unless the disease spread beyond membranous cord. Hoarseness is MC and the earliest symptom^Q because of this glottic cancer is detected early. 	<ul style="list-style-type: none"> Least common site^Q. Subglottic region extends from glottic area to lower border of cricoid cartilage. Spreads locally around anterior wall to opposite side or down wards to trachea, upward spread to vocal cord is late and hoarseness is not an early symptom^Q. Lymphatic metastases to prelaryngeal, pretracheal (Delphian node^Q) and lower jugular nodes. Earliest and most prominent symptom is stridor^Q, but it appears only in advanced stage. Hoarseness is late feature.

Treatment of CA Larynx		
Stage	Site	Treatment
T ₁	All site	<ul style="list-style-type: none"> External beam radiotherapy^Q
T ₂	Glottic and Subglottic lesion Supraglottic lesion	<ul style="list-style-type: none"> Radiotherapy^Q Supraglottic laryngectomy^Q
T ₃ and T ₄	All sites	<ul style="list-style-type: none"> Total laryngectomy with neck dissection^Q for clinically positive nodes with post-operative radiotherapy if nodes are not palpable

CA NASOPHARYNX

57. Ans. b. Nasopharyngeal carcinoma (Ref: Sabiston 19/e p808-810; Schwartz 10/e p580, 593-594, 9/e p502; Bailey 26/e p681-683, 25/e p709-710; Devita 9/e p764-766)

NASOPHARYNGEAL CARCINOMA

- Nasopharyngeal cancer is **most common in China** particularly in **southern states** and **Taiwan**^Q.
- People in **Southern China, Taiwan and Indonesia** are more prone to this cancer^Q.
- MC tumor** to produce **cervical LN metastasis**^Q
- MC tumor** responsible for **secondaries in the neck** with **no obvious primary malignancy**^Q

- Burning of incense or wood (Polycyclic hydrocarbon)**, use of **preserved salted fish (Nitrosamines)** along with **vitamin C deficient diet** (vitamin C blocks nitrosification of amines and is thus protective) may be other factors operative in China^Q.

Etiology

- Exact etiology is not known. The **factors responsible** are:
 - Genetic:** Chinese
 - Viral:** Epstein-Barr virus^Q
 - Environmental:** Air pollution, smoking of tobacco and opium, **nitrosamines** from **dry salted fish**, **smoke from burning of incense and wood**

Pathology

- Squamous cell carcinoma**^Q in various grades of its differentiation or its variants as transitional cell carcinoma and lymphoepithelioma, is the most common.

- MC site of origin:** **Fossa of Rosenmuller** in the lateral wall of **Nasopharynx**^Q.
- LN involvement** is **common** because of **rich lymphatic network** in the **nasopharynx**^Q.

Clinical features

- Age:** It is mostly seen in **fifth to seventh decades** but may involve younger age groups.
- Sex:** **Males** are three times more prone than females.
- Cervical lymphadenopathy** is **MC presenting symptom** (60-90%)^Q.

- **Nasal:** Nasal obstruction, nasal discharge, denasal speech (rhinolalia clausa) and epistaxis.^Q
- **Otologic:** Due to obstruction of Eustachian tube, there is conductive hearing loss, serous or suppurative otitis media.^Q

- Presence of **unilateral serous otitis media** in an **adult** should raise suspicion of nasopharyngeal growth.
- Involvement of **IX, X and XI cranial nerves** may occur, constituting **jugular foramen syndrome**.

- Can cause **conductive deafness** (Eustachian tube blockage), **ipsilateral temporoparietal neuralgia** (involvement of CN V) and **palatal paralysis** (CN X)-collectively called **Trotter's triad**.

- **Cervical nodal metastases** may be the **only manifestation** of **nasopharyngeal cancer**^Q.
- **Nodal metastases** are seen in **75%** of the patients, when first seen, **about half of them** with **bilateral nodes**.
- **Distant metastases** involve **bone, lung, liver** and other sites.

- **Jaccoud's triad:** Ipsilateral **ophthalmoplegia** + **Amaurosis** + Ipsilateral **neuralgia**^Q

Diagnosis

- **CT scan:** Demonstrate **erosion of bone** at the base of skull and the **extent of tumor**.
- **Biopsy** is **essential** to show the **exact histology** of the malignancy.

- In **absence of nasopharyngeal lesion** but with **strong suspicion of malignancy**, **nasopharynx** is **exposed by transpalatal approach** and a **strip of mucosa and submucosa** from the region of **fossa of Rosenmuller** should be taken and subjected to **histology**.

Treatment

- **Irradiation**^Q is treatment of choice.
- **Chemo therapy** for stage **III** and **IV** cancers

58. Ans. b. Nasopharyngeal carcinoma

59. Ans. c. CA Nasopharynx

MISCELLANEOUS

60. Ans. d. 2nd and 3rd rib erosion (Ref: Sabiston 19/e p1582; Schwartz 10/e p623, 641-642, 9/e p534)

PANCOAST TUMOR (SUPERIOR SULCUS TUMOR)

- Pancoast's or superior sulcus tumor results from **local extension** of a tumor growing in the **apex of the lung** with **involvement of 8th cervical and 1st and 2nd thoracic nerves**, with **shoulder pain** characteristically radiates in the **ulnar distribution** of the arm, often with **radiologic destruction of 1st and 2nd ribs**^Q.
- Often **Horner's syndrome** and **Pancoast's syndrome** co-exist

Treatment

- **Preoperative RT** followed by **En-bloc resection of lung and chest wall**^Q with consideration of postoperative RT or intra operative brachytherapy.

61. Ans. c. Hard palate (Ref: Bailey 25/e p734, 738; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p288-289)

- **LN metastasis** is **most common in:** CA tongue^Q > Floor of mouth > Lower alveolus > Buccal mucosa > Upper alveolus > **Hard palate** > Lip^Q.

62. Ans. b. Radical neck dissection (Ref: www.ajnr.org/content/28/1/181)

History of radiation exposure followed by **radical neck dissection** increases the **risk of carotid blowout** in head and neck cancers.

CAROTID BLOWOUT

- Carotid blowout refers to **rupture of the carotid** and its **branches**
- It is **one of the most devastating complications** associated with **therapy for head and neck cancers**^Q

- Carotid blowout tends to occur in **head and neck cancer**^Q, **radiation induced necrosis**^Q, **recurrent tumors**^Q or **pharynocutaneous fistulas**^Q.

- The **clinical signs and symptoms** related to rupture of carotid artery have been referred as **carotid blowout syndrome**
- Reported **morbidity and mortality rates** are **40% and 60%** respectively.

63. Ans. a. Sublingual dermoid (Ref: Schwartz 9/e p1344-1345)

Structures Moving with Deglutition

- | | |
|--|---|
| <ul style="list-style-type: none"> • Thyroid gland^Q • Thyroglossal cyst^Q | <ul style="list-style-type: none"> • Pre and paratracheal nodes^Q • Sub-hyoid bursa^Q |
|--|---|

64. Ans. d. T0N2aMx

Facial Injuries and Abnormalities

MULTIPLE CHOICE QUESTIONS

CLEFT LIP AND PALATE

1. **True about cleft palate:** (PGI Nov 2010)
 - a. Surgery should be done at 1 year
 - b. 50% recover speech after operation
 - c. Associated with hearing loss
 - d. Associated with cleft lip in 45%
2. **Surgical correction in cleft palate primarily aims at all of the following except:** (MCI March 2010)
 - a. Control of regurgitation
 - b. To promote normal dentition and facial growth
 - c. To get a normal speech
 - d. Normal appearance of lips, nose and face
3. **Ideal time for cleft lip repair surgery:** (MHPGMCET 2006, JIPMER 97)
 - a. 3-6 weeks
 - b. 6-12 weeks
 - c. 1-1.5 years
 - d. 3-4 years
4. **Ideal time for surgery in case of unilateral cleft lip?** (MHPGMCET 2008)
 - a. <3 months
 - b. 3 to 6 months
 - c. 6 to 9 months
 - d. >12 months
5. **All are do about submucosal cleft palate except:** (DNB 2012)
 - a. Bifid uvula
 - b. Notched hard palate
 - c. Lip pits
 - d. Zonapellucida
6. **Which is the appropriate age for repair of cleft palate?** (All India 98, 94, AIIMS June 98)
 - a. 6 months to 1 year
 - b. 12-15 months
 - c. At puberty
 - d. Just after birth
7. **With respect to repair of cleft palate, the soft palate is first repaired, ideal time for which is?**
 - a. 12 months
 - b. 9 months
 - c. 6 months
 - d. 3 months
8. **Commonest type of cleft lip is:** (AIIMS 91)
 - a. Bilateral
 - b. Midline
 - c. Combined with cleft palate
 - d. Unilateral
9. **In cleft lip operation all the stitches are removed on:** (PGI 81, 82, AIIMS 85)
 - a. 2nd day
 - b. 4th day
 - c. 10th day
 - d. 14th day
10. **Unilateral clefts are most common on:** (PGI 80)
 - a. Left side
 - b. Right side
 - c. Median
 - d. None of the above
11. **The following is the method for operating cleft lip except:** (JIPMER 81, AIIMS 86)
 - a. Le Mesurier's method
 - b. Tennison's method
 - c. Millard's method
 - d. Wardill's method
12. **Cleft lip is due to non fusion of:** (PGI 2001)
 - a. Maxillary process with lateral nasal process
 - b. Maxillary process with medial nasal process
 - c. Maxillary process with mandibular process
 - d. All of the above
13. **Unilateral cleft lip is associated with:** (PGI 99)
 - a. Posterior displacement of alar cartilage
 - b. Columella elongated
 - c. Always cleft palate
 - d. Defective sucking
14. **Most common congenital anomaly of the face is:** (MCI March 2008)
 - a. Cleft lip alone
 - b. Isolated cleft palate
 - c. Cleft lip and cleft palate
 - d. All have equal incidence
15. **Millards 'Rule of Ten' includes all except:** (AMU 95)
 - a. 10 lbs
 - b. 10 weeks of age
 - c. 10 gm% hemoglobin
 - d. 10 months of age
16. **In LAHSHAL terminology for cleft lip and cleft palate, LAHSHAL denotes:** (Recent Questions 2013)
 - a. Bilateral cleft palate only
 - b. Bilateral cleft lip only
 - c. Bilateral cleft lip and palate
 - d. No cleft
17. **Which of the following is the ideal time for the repair of cleft palate?** (Recent Question 2014, AIIMS November 2014)
 - a. 9-12 months
 - b. 18-24 months
 - c. 2-3 years
 - d. 5-6 years
18. **Pierre Robbin's sequence includes:** (PGI Dec 2008)
 - a. Glossoptosis
 - b. Airway obstruction
 - c. Cleft lip
 - d. Micrognathia
 - e. Heart anomaly
19. **Which one of the following is the primary defect in Pierre Robbin's syndrome?** (UPSC 2006)
 - a. Micrognathia
 - b. Glossoptosis
 - c. High arched palate
 - d. Cleft palate

20. **Pierre Robbin's syndrome is:** (AIIMS 85)
 a. Cleft palate with syndactyly
 b. Cleft palate with mandibular hypoplasia and respiratory obstruction
 c. Cleft lip with mandibular hypoplasia
 d. Cleft lip

21. **Hynes pharyngoplasty is used to improve a child's:** (JIPMER 81, AMU 89)

- a. Appearance b. Teething
 c. Speech d. Feeding

22. **Rhinoplasty is usually done at the age (years) of until the nose is fully grown:** (JIPMER 81, AIIMS 86)

- a. 6 years b. 12 years
 c. 16 years d. 25 years

23. **Rhitectomy operation involves:** (JIPMER 92)

- a. Correction of nasal defects
 b. Removal of wrinkles in forehead
 c. Straightening of curved penis
 d. Correction of protruding lips

MAXILLOFACIAL INJURY

24. **Fracture mandible with edentulous jaw is best treated with:** (UPPG 2004)

- a. External fixator
 b. Minerva-plaster
 c. Interdental wiring
 d. Intermaxillary elastic traction

25. **Best view for mandible is:** (UPPG 2007)

- a. Antero-posterior
 b. Lateral
 c. Oblique
 d. Orthopantomogram

26. **A man sustained injury and presented with fluid coming out through nose. What could be the possible fracture?** (MCI March 2007)

- a. Fracture base of skull
 b. Fracture of mandible
 c. Fracture of maxilla
 d. None of the above

27. **A 20-years old man is hit on the eye with a ball. On examination there is restriction of lateral and upward gaze and diplopia. There is no obvious visible sign of enophthalmos, the likely diagnosis is:** (DPG 2011, AIIMS 85)

- a. Zygoma fracture
 b. Maxillary fracture
 c. Blow out fracture of the orbit
 d. Injury to lateral rectus

28. **Best treatment of above condition will be:** (AIIMS 85)

- a. Do nothing and assurance
 b. Explore the orbit
 c. Ophthalmic exercise to correct diplopia
 d. Reinsertion of lateral rectus muscle

29. **Clinical feature of fracture of zygomatic bone include all of the following except:** (All India 97)

- a. Diplopia b. Trismus
 c. Bleeding d. CSF rhinorrhea

30. **Mandible is commonly fractured:** (JIPMER 87)

- a. At the neck of the condyle
 b. Through the angle
 c. Through the canine fossa
 d. At the middle

31. **Le Forte II facial fracture implies:** (AIIMS 84)

- a. Fracture running through alveolar ridge
 b. Fracture running through midline of the palate and zygomatico maxillary suture
 c. Fracture running through zygomatic process of the maxilla, floor of orbit, root of nose on one side only
 d. Similar to C but on both sides

32. **Tripod fracture is seen in:** (DNB 2010)

- a. Zygomatic bone
 b. Temporomandibular joint
 c. Maxilla
 d. Frontal bone

33. **Costen's syndrome refers to neurological pain associated with:** (DNB 2010)

- a. Sphenopalatin ganglion b. Temporomandibular joint
 c. Glossopharyngeal nerve d. Lingual nerve

EXPLANATIONS

CLEFT LIP AND PALATE

1. Ans. a. Surgery should be done at 1 year, c. Associated with hearing loss, d. Associated with cleft lip in 45% (Ref. Sabiston 19/e p1923-1924; Schwartz 10/e p1840-1844, 9/e p1658-1663; Bailey 26/e p634-648, 25/e p657-668)

CLEFT LIP AND PALATE

- Clefts of the lip, alveolus and hard and soft palate are the MC congenital abnormalities of the orofacial structures^Q.
- Frequently occur as isolated deformities but can be associated with other medical conditions, particularly congenital heart disease^Q.

- Incomplete clefts affect only a portion of the lip and contain a bridge of tissue connecting the central and lateral lip elements, referred to as Simonart's band^Q.
- Cleft lip is due to non-fusion of maxillary process with medial nasal process^Q.
- Unilateral cleft lip is associated with posterior displacement of alar cartilage^Q.

Incidence

- Highest incidence reported for cleft lip and palate occurs in the Indian tribes of Montana, USA (1:276).
- Cleft lip/palate predominates in males^Q.
- Cleft palate alone appears to be more common in females^Q.

- Incidence of cleft lip and palate is 1:600 live births^Q • Incidence of isolated cleft palate is 1:1000 live births^Q.

Distribution

- In unilateral cleft lip the deformity affects the left side^Q in 60% of cases.

Typical distribution of cleft types

- Cleft lip alone: 15% • Cleft lip and palate: 45% (MC)^Q • Isolated cleft palate: 40%

Etiology of cleft lip and palate

- Etiology of cleft lip and palate: Genetic predisposition and a contributory environmental component^Q.
- Environmental factors: Maternal epilepsy^Q and drugs (steroids, diazepam and phenytoin^Q).

Associated syndromes

- Although most clefts of the lip and palate occur as an isolated deformity, Pierre Robin sequence remains the most common syndrome^Q.
- Other associated syndromes: Stickler's (ophthalmic and musculoskeletal abnormalities), Shprintzen's (cardiac anomalies), Down's, Apert's and Treacher-Collins' syndromes.

Types of cleft lip	Types of cleft palate
<ul style="list-style-type: none"> Unilateral cleft lip Bilateral cleft lip 	<ul style="list-style-type: none"> Incomplete: Cleft of the hard palate remains attached to the nasal septum and vomer^Q Complete: Nasal septum and vomer are completely separated from the palatine processes^Q

Antenatal diagnosis

- All but isolated cleft palate can be diagnosed by ultrasound after 18 weeks^Q gestation

Problems immediately after birth

- Some babies are able to feed normally but some will need assistance
- Breathing problems in Pierre Robin sequence may be life threatening

Management

- Surgical techniques are aimed at restoring normal anatomy.

Cleft lip	Repaired between 3-6 months of age ^Q
Cleft palate	Repaired between 6-18 months of age ^Q

Principles of Surgery

- Cleft lip surgery attaches and reconnects the muscles around the oral sphincter^Q
- Cleft palate surgery aims to bring together mucosa and muscles with minimal scarring^Q
- Two-stage procedures attempt to minimize dissection^Q

Secondary Management

- Following primary surgery, **regular review by a multidisciplinary team** is essential^Q.
- Many aspects of cleft care require long-term review: **Hearing, speech, dental development, facial growth**^Q.

2. Ans. d. Normal appearance of lips, nose and face (Ref. Sabiston 19/e p1923-1924; Schwartz 10/e p1840-1844, 9/e p1658-1663; Bailey 25/e p662-668)

OBJECTIVES OF THE CLEFT PALATE REPAIR

- To produce **anatomical closure** of the defect^Q.
- To create an apparatus for **development and production of normal speech**^Q.
- To **minimize** the **maxillary growth disturbances** and **dento-alveolar deformities**^Q.

3. Ans. b. 6-12 weeks

4. Ans. b. 3 to 6 months

5. Ans. c. Lip pits (Ref. Cleft Palate and Craniofacial abnormalities by Ann W. Kummer/51)

SUBMUCOSAL CLEFT PALATE

- A congenital defect that affects the underlying structure of the palate, while the **oral surface mucosa is intact**
- Most children with submucosal cleft palate are asymptomatic and this is often not diagnosed until later
- Identification of submucosal cleft palate requires intraoral examination for:
 1. Bifid uvula
 2. **Zona pellucida** (submucosal absence of musculus uvulae)
 3. **Notching of posterior border of hard palate**
 4. **Nasopharyngeal regurgitation during feeding** (only finding of occult submucosal cleft palate)

6. Ans. a. 6 months to 1 year

7. Ans. c. 6 months (Ref. Bailey 25/e p661)

Timing of Primary Cleft Lip and Palate Procedures (after Delaire)

Cleft lip alone	Cleft palate alone	Cleft lip and palate
<ul style="list-style-type: none"> • Unilateral (one side): One operation at 5-6 months • Bilateral (both sides): One operation at 4-5 months 	<ul style="list-style-type: none"> • Soft palate only: One operation at 6 months^Q • Soft and hard palate: Two operations • Soft palate at 6 months^Q • Hard palate at 15-18 months 	<ul style="list-style-type: none"> • Unilateral: Two operations • Cleft lip and soft palate at 5-6 months • Hard palate and gum pad with or without lip revision at 15-18 months • Bilateral: Two operations • Cleft lip and soft palate at 4-5 months • Hard palate and gum pad with or without lip revision at 15-18 months

8. Ans. c. Combined with cleft palate

9. Ans. b. 4th day (Ref. Sabiston 18/e p2134)

Guidelines for Day of Suture Removal by Area			
Body Regions	Removal	Body Regions	Removal
Eyelid	3-4	Chest, abdomen	8-10
Eyebrow	3-5	Ear	10-14
Nose	3-5	Back	12-14
Lip	3-4 ^Q	Extremities	12-14
Face (other)	3-4 ^Q	Hand	10-14
Scalp	6-8 days	Foot, sole	12-14

10. Ans. a. Left side

11. Ans. d. Wardill's method (Ref. Sabiston 19/e p1924; Schwartz 10/e p1840-1844, 9/e p1661; Bailey 25/e p661-662)

CLEFT LIP REPAIR TECHNIQUES

- Millard Rotation Advancement Technique: Most widely used^Q
- Le Muserier^Q
- Thompson^Q
- Tennison-Rendall^Q

12. Ans. b. Maxillary process with medial nasal process 13. Ans. a. Posterior displacement of alar cartilage
 14. Ans. c. Cleft lip and cleft palate
 15. Ans. d. 10 months of age (Ref. http://en.wikipedia.org/wiki/Cleft_lip_and_palate)

"RULE OF 10s" BY SURGEONS WILHELMMESEN AND MUSGRAVE

Surgery is done in cleft lip in a child when

- Age ≥ 10 weeks^Q
- Weight ≥ 10 pounds^Q
- Hemoglobin ≥ 10 gm^Q

16. Ans. c. Bilateral cleft lip and palate 17. Ans. a. 9-12 months
 18. Ans. a. Glossoptosis, b. Airway obstruction, d. Micrognathia (Ref. *Schwartz* 10/e p1848, 9/e p1665; *Bailey* 25/e p657; *Nelson* 18/e p1534)

PIERRE ROBIN SEQUENCE

- Pierre Robin sequence remains the **most common syndrome** in clefts of the lip and palate
- Pierre Robin sequence is **characterized by three pathognomonic findings**:
 1. Microretrognathia (primary defect)^Q
 2. Glossoptosis^Q
 3. Respiratory distress^Q
- **Pierre Robin sequence may or may not be associated with a palatal cleft^Q.**
- **Micrognathia prevents the natural caudal migration of the tongue** resulting in the deformity^Q.
- Functional consequences include **intermittent respiratory obstruction** and **obstructive sleep apnea** that may affect feeding, growth, and safety of the airway^Q.
 - **Posteriorly displaced tongue (glossoptosis), which is associated with early respiratory and feeding difficulties^Q.**
 - **Treatment: Beverly-Douglas procedure (Tongue is fixed anteriorly^Q)**

19. Ans. a. Micrognathia 20. Ans. b. Cleft palate with mandibular hypoplasia and respiratory obstruction
 21. Ans. c. Speech (Ref. *Bailey* 25/e p663; www.ncbi.nlm.nih.gov/pubmed/3547432)

HYNES PHARYNGOPLASTY

- Used for the treatment of **Velopharyngeal incompetence** leading to **speech problems^Q**

22. Ans. c. 16 years (Ref. *Bailey* 26/e p645, 25/e p669; <http://en.wikipedia.org/wiki/Rhinoplasty>)

ORTHOGNATHIC SURGERY

- **Orthognathic surgery** is to correct conditions of the jaw and face related to structure, growth
- Orthognathic surgery is **usually performed** when facial growth is **complete** (16 years in female patients, 19 years in male patients^Q).
- It's suggested to get **rhinoplasty** (correcting and reconstructing the form, restoring the functions, and aesthetically enhancing the nose) done after **16 years^Q** of age, when **natural bone structure** is "**settled**".

23. Ans. b. Removal of wrinkles in forehead (Ref. *Dorland's Dictionary* 28/e p1463)

RHYTIDECTOMY

- A facelift operation by **surgical removal of wrinkles^Q**
- Type of **cosmetic surgery** procedure used to **give a more youthful facial appearance**.

MAXILLOFACIAL INJURY

24. Ans. a. External fixator (Ref. *Sabiston* 19/e p1925-1927; *Schwartz* 10/e p197, 9/e p487; *Bailey* 26/e p346, 25/e p331-332)

FRACTURES OF THE MANDIBLE

- **Condylar neck^Q** is the **weakest part** of the mandible and MC site of **fracture^Q**
 - Mandible **may fracture directly** at the **point of the blow^Q**
 - **Indirectly** where the **force from the blow is transmitted** and the **mandible fractures at a point of weakness distant from the original blow**, known as '**guardsman**' fracture^Q.

- 'Butterfly' fracture of the mandible: A segment of mandible is detached from the rest of the mandible in the canine regions^Q.

Diagnosis

- Recommended radiographic evaluation of a mandible fracture: Panoramic radiograph (Panorex) and Towne's view x-ray^Q.

Treatment

- As in midface fractures, restoration of dental occlusion forms the foundation for fracture management^Q.
 - Intermaxillary fixation before fracture exposure and plating is necessary^Q.
- Condylar and subcondylar mandible fractures are most often treated by IMF alone^Q.
- Medical management of mandibular fractures involves a purée-type diet, interdental fixation for several weeks, 1% chlorhexidine mouth rinses, and antibiotics^Q.

25. Ans. d. Orthopantomogram

26. Ans. a. Fracture base of skull (Ref. Sabiston 19/e p1890; Schwartz 10/e p576, 9/e p1523-1524; Bailey 26/e p314, 25/e p302,308)

BASILAR SKULL FRACTURE

- Fracture of the base of the skull, typically involving the temporal bone, occipital bone, sphenoid bone, and/or ethmoid bone^Q.
- Such fractures can cause tears in the meninges, with resultant leakage of the CSF^Q.
 - Leaking fluid may accumulate in the middle ear space, and dribble out through a perforated eardrum (CSF otorrhea^Q) or into the nasopharynx via the eustachian tube, causing a salty taste.
 - CSF may also drip from the nose (CSF rhinorrhea^Q) in fractures of the anterior skull base, yielding a halo sign^Q.
 - These signs are pathognomonic for basilar skull fracture^Q.

27. Ans. c. Blow out fracture of the orbit (Ref. Sabiston 19/e p1925-1927; Schwartz 10/e p577, 9/e p486; Bailey 26/e p627, 25/e p650)

BLOW-OUT FRACTURES OF THE ORBIT

- Direct trauma to the globe of the eye may push it back within the orbit.
- Occur when a blunt object strikes the globe^Q.
- Weakest plate of bone, most commonly the orbital floor, fractures, and the orbital contents herniate down into the maxillary antrum^Q.
- Tear-drop sign^Q is seen
 - Soft-tissue herniation lead to muscular dysfunction, particularly the inferior oblique and inferior rectus, leading to failure of the eye to rotate upwards.
 - Enophthalmos and diplopia can follow^Q
 - Paraesthesia in the distribution of the infraorbital nerve is an important clue to the blow-out fracture^Q.

Treatment

- Significant delay in treatment may be associated with less success than early diagnosis and planned treatment.
- Orbital floor exploration allows for release of displaced or entrapped soft tissue, correcting any extra-ocular motility disturbances^Q.

28. Ans. b. Explore the orbit

29. Ans. d. CSF rhinorrhea (Ref. Sabiston 19/e p1925-1927; Schwartz 10/e p577, 1854-1855, 9/e p487; Bailey 25/e p330)

ZYGOMATIC BONE FRACTURE

- MC fracture of the middle third of the face: Nose > zygomatic bone^Q
- Also known as Tripod fracture^Q, because the zygoma is fractured at its 3 processes:
 1. Zygomatico-frontal fracture^Q
 2. Zygomatico-temporal fracture^Q
 3. Infraorbital fracture^Q

Clinical Features of Zygomatic Bone Fracture

- | | |
|--|---|
| <ul style="list-style-type: none"> • Flattening of malar prominence^Q • Step-deformity of infraorbital margin • Epistaxis^Q • Restricted ocular movements due to entrapment of inferior rectus muscle^Q (may lead to diplopia^Q) | <ul style="list-style-type: none"> • Anesthesia in the distribution of infraorbital nerve^Q • Oblique palpebral fissure, due to entrapment of lateral palpebral ligament • Periorbital emphysema due to escape of air from the maxillary sinus |
|--|---|

Diagnosis

- X-ray Water's view^Q
- CT scan: Best for diagnosis of zygomatic bone fracture^Q

Treatment

- Only displaced fractures require treatment^Q
- Treatment of choice: Open reduction and internal fixation^Q

30. Ans. a. At the neck of the condyle

31. Ans. d. Similar to C but on both sides (Ref. *Sabiston 19/e p1927; Schwartz 9/e p487-488; Bailey 26/e p344-345, 25/e p329-330*)

MIDFACE FRACTURES

- Midface fractures involving the maxilla can be classified by fracture patterns know as **Le Fort I, II, and III**.

Le Fort I	<ul style="list-style-type: none"> • Fracture line runs above and parallel to palate^Q • Effectively separates alveolus and palate from the facial skeleton above^Q 	
Le Fort II	<ul style="list-style-type: none"> • Pyramidal in shape^Q • Passes through the root of nose, lacrimal bone, floor of orbit, upper part of maxillary sinus and pterygoid plate^Q • Orbital floor is always involved^Q 	
Le Fort III	<ul style="list-style-type: none"> • Complete disjunction of the facial skeleton from the skull base^Q • Fracture line runs high through the nasal bridge, septum and ethmoids, and through the bones of orbit to the frontozygomatic suture^Q. 	

Management:

- Interdental or intermaxillary fixation is necessary to reestablish the proper dentoskeletal relationships, immobilize the fractured bones, and ensure normal postoperative occlusion^Q.

32. Ans. a. Zygomatic bone

33. Ans. b. Temporomandibular joint (Ref. *Dhingra 4/e p400*)

COSTEN'S SYNDROME

- Abnormality of temporomandibular joint due to defective bite
- Characterized by otalgia, feeling of blocked ear, tinnitus and sometimes vertigo
- Pain also radiates to frontal, parietal and occipital region

SECTION 9

ONCOLOGY

CHAPTERS

- ❖ Oncology
- ❖ Sarcoma

MULTIPLE CHOICE QUESTIONS

TUMOR MARKERS

- The following is a marker of Paget's disease of the mammary gland: (All India 2007)
 - S-100
 - HMB-45
 - CEA
 - Neuron specific enolase
- In which of the following tumors alpha-feto protein is elevated? (AIIMS Nov 2005)
 - Choriocarcinoma
 - Neuroblastoma
 - Hepatocellular carcinoma
 - Seminoma
- Which of the following tumor secretes erythropoietin? (PGI June 2010)
 - Pheochromocytoma
 - Hepatoma
 - RCC
 - Adrenal adenoma
 - Breast cancer
- Uses of tumor marker are: (PGI June 2001)
 - Screening of a cancer
 - Follow-up a cancer patient, especially for knowing about recurrence
 - Confirmation of a diagnosed cancer
 - For monitoring the treatment of a cancer
- Erythropoietin secreting tumor: (PGI June 2001)
 - Cerebellar hemangioblastoma
 - Hepatoma
 - Renal cell carcinoma
 - Adrenal adenoma
 - Fibromyoma of uterus
- CA-125 is associated with: (PGI June 2002)
 - Colon carcinoma
 - Breast carcinoma
 - Ovarian carcinoma
 - Bronchogenic carcinoma
 - Pancreatic carcinoma
- CA-125 is associated with: (PGI Dec 2007)
 - Pregnancy
 - Breast carcinoma
 - TB
 - Endometrial carcinoma
 - Endometriosis
- CEA is associated with: (PGI June 2002)
 - Adenocarcinoma of colon
 - Pancreatic carcinoma
 - Neuroblastoma
 - Ovarian carcinoma
 - Prostatic carcinoma
- AFP is raised in: (PGI Dec 2003)
 - CA Prostate
 - HCC
 - CA Lung
 - CA Breast
 - CA Colon

- Which one of the following is frequent cause of serum alpha-fetoprotein level greater than 10 times the normal upper limit? (UPSC 2004)
 - Seminoma
 - Metastatic carcinoma of liver
 - Cirrhosis of liver
 - Oat cell tumour of lung
- Which of the following is marker for carcinoma? (All India 2012)
 - Cytokeratin
 - Vimentin
 - Calcitonin
 - CD-45
- α -Fetoprotein increase in all the following except: (All India 94)
 - Hepatocellular carcinoma
 - Seminoma of the testes
 - GI neoplasms
 - Embryonal cell carcinoma
- All are recognized tumour markers except: (PGI Dec 99)
 - Beta hCG
 - Beta-2 microglobulin
 - Alpha fetoprotein
 - Acid phosphatase
- CEA is increased in all except: (AIIMS May 2007)
 - Lung cancer
 - Breast cancer
 - Colon cancer
 - Osteogenic sarcoma
- Regarding CEA-false is: (AIIMS 97)
 - Prognostic indicator
 - Glycoprotein
 - Elevated in colorectal carcinoma
 - Elevated only when there is hepatic metastasis

SCREENING IN MALIGNANCY

- In which of the following disease, the overall survival is increased by screening procedure? (All India 2005)
 - Prostate cancer
 - Lung cancer
 - Colon cancer
 - Ovarian cancer
- Screening increase life span in which of the following carcinoma? (PGI June 2007)
 - Breast
 - Colon
 - Prostate
 - Lung
- Screening is useful for: (PGI Nov 2011)
 - Carcinoma Lung
 - Carcinoma Breast
 - Carcinoma Skin
 - Carcinoma Cervix
 - Carcinoma Ovary
- Least amenable to screening is: (AIIMS June 94)
 - Breast
 - Cervix
 - Oral cavity
 - Lung

LYMPH NODE METASTASIS

20. Which one of the following is the most common tumor to produce metastasis to cervical lymph nodes?
(UPSC 2008, AIIMS June 2002)
 - a. Glottic carcinoma
 - b. Nasopharyngeal carcinoma
 - c. Carcinoma base of tongue
 - d. Carcinoma lip
21. In which of the following head and neck cancers, is lymph node metastasis least common?
(AIIMS May 2008)
 - a. Tongue
 - b. Buccal mucosa
 - c. Hard palate
 - d. Lower alveolus
22. Delphian nodes are:
(COMEDK 2008)
 - a. Pretracheal
 - b. Paratracheal
 - c. Supraclavicular
 - d. Posterior triangle
23. A 55 years old chronic smoker presents with complaints of hoarseness of voice, and single enlarged painless lymph node in left supraclavicular region. Next step to be done:
(AIIMS Nov 2000)
 - a. CT Scan of chest
 - b. Sputum examination for AFB
 - c. Laryngoscopy and chest X-ray
 - d. Excision biopsy of the node
24. A patient comes with stony hard, painless lymph node in left supraclavicular fossa. A biopsy report states squamous cell carcinoma. What is the diagnosis?
(AIIMS Nov 99)
 - a. Stomach carcinoma
 - b. Breast carcinoma
 - c. Lung carcinoma
 - d. Pancreatic carcinoma
25. A 65 years old smoker presents with hoarseness, hemoptysis and a hard painless lump in the left supraclavicular fossa. Which of the following is the most appropriate diagnostic step?
(AIIMS June 2004)
 - a. Undertake an open biopsy of the neck lump
 - b. Undertake a radical neck dissection
 - c. Do fine needle aspiration cytology
 - d. Give a trial of Anti tuberculous therapy
26. Which carcinoma most commonly metastasizes to cervical lymph nodes?
(AIIMS June 93)
 - a. Maxillary sinus
 - b. Posterior tongue
 - c. Cheek
 - d. Hard palate
27. Lymph node metastasis is a common feature with the following variant of soft tissue sarcoma:
(All India 97)
 - a. Fibrosarcoma
 - b. Angiosarcoma
 - c. Liposarcoma
 - d. Neurofibrosarcoma

BONE METASTASIS

28. Most common cause of skeletal metastasis is:
(UPPG 2009)
 - a. Kidney
 - b. Prostate
 - c. Breast
 - d. Thyroid
29. Treatment of bony metastasis is by:
(JIPMER 2011)
 - a. Samarium-153
 - b. I-131 with tositumumab
 - c. P-32
 - d. Yttrium
30. Best investigation for bone metastasis is:
(All India 2012, 2011)
 - a. MRI
 - b. CT
 - c. Bone scan
 - d. X-ray
31. Bony metastasis is common with all of the following except:
(All India 98)
 - a. CA breast
 - b. CA lung
 - c. CA testis
 - d. CA prostate

32. Not true about bone metastasis:
(AIIMS June 98)
 - a. Uncommon distal to elbow and knee
 - b. Breast secondary may be osteoblastic
 - c. Renal cell carcinoma secondary are expansile
 - d. Soft tissue sarcoma causes bony metastasis
33. Secondaries of all following cause osteolytic lesions except:
(All India 95)
 - a. Prostate
 - b. Kidney
 - c. Bronchus
 - d. Thyroid
34. Expansile lytic osseous metastases are characteristic of primary malignancy of:
 - a. Kidney
 - b. Bronchus
 - c. Breast
 - d. Prostate
35. A malignant tumor of childhood, that metastasizes to bones most often is:
(All India 2006)
 - a. Wilm's tumor
 - b. Neuroblastoma
 - c. Adrenal gland tumors
 - d. Granulosa cell tumor of ovary
36. All of the following produce osteoblastic secondaries except:
(DNB 2012, All India 94)
 - a. CA Prostate
 - b. Carcinoid tumors
 - c. CA Breast
 - d. Multiple myeloma
37. Which of the following is rare site for metastasis?
(SGPGI 2004)
 - a. Vertebrae
 - b. Skull
 - c. Pelvis
 - d. Forearm and leg bones
38. Pulsating tumors include all except:
(PGI 88)
 - a. Bone sarcoma
 - b. Osteoclastoma
 - c. Secondaries from hypernephromas
 - d. Secondary from prostate
39. Most common primary of metastatic bone tumour in a male is:
(DNB 2009)
 - a. Lung
 - b. Liver
 - c. Bone
 - d. Brain

ONCOLOGICAL EMERGENCIES

40. Feature of tumor lysis syndrome are:
(PGI Dec 2000)
 - a. Hypocalcemia
 - b. Hypophosphatemia
 - c. Alkalosis
 - d. Hypokalemia
41. Features of tumor lysis syndrome:
(PGI May 2011, PGI Dec 2006)
 - a. Hyperuricemia
 - b. Hypercalcemia
 - c. Hypophosphatemia
 - d. Hyperphosphatemia
 - e. Hyperkalemia
42. True about tumor lysis syndrome are all except:
(JIPMER 2013, PGI Dec 2003)
 - a. Hyperkalemia
 - b. Hypercalcemia
 - c. Hyperuricemia
 - d. Hyperphosphatemia
43. Tumor lysis syndrome is associated with all of the following laboratory feature except:
(DNB 2012, AIIMS Nov 2003)
 - a. Hyperkalemia
 - b. Hypercalcemia
 - c. Hyperuricemia
 - d. Hyperphosphatemia
44. Hypercalcemia associated with malignancy is most often mediated by:
(All India 2005)
 - a. PTH
 - b. PTH-rp
 - c. IL-6
 - d. Calcitonin

45. Hypercalcemia of malignancy treatment consist of all except: (PGI May 2011)

- | | |
|------------------|--------------------|
| a. Dexamethasone | b. Saline infusion |
| c. Pamidronate | d. Furosemide |
| e. Phosphate | |

46. A patient with leukemia on chemo therapy develops acute lower abdominal pain associated with anaemia, thrombocytopenia and leucopenia. Which of the following is clinical diagnosis? (All India 2006)

- | | |
|----------------------------|------------------------|
| a. Appendicitis | b. Leukemic colitis |
| c. Perforation peritonitis | d. Neutropenic colitis |

47. Which of the following are features of tumor lysis syndrome? (PGI 2006)

- | | |
|----------------------|---------------------|
| a. Hyperuricemia | b. Hyperkalemia |
| c. Hypercalcemia | d. Hypophosphatemia |
| e. Hyperphosphatemia | |

48. Which of the following tumor is most commonly associated with superior vena cava syndrome? (Recent Question 2014, WBPG 2012, All India 2011)

- | | |
|-----------------------------|-------------------------|
| a. Lymphoma | b. Small cell carcinoma |
| c. Non small cell carcinoma | d. Metastasis |

49. Which of the following is not an oncological emergency? (AIIMS June 2003)

- | |
|---------------------------------------|
| a. Spinal cord compression |
| b. Superior vena cava syndrome |
| c. Tumor lysis syndrome |
| d. CA cervix stage IIIB with pyometra |

LYMPHOMA

50. Commonest site for lymphoma in GIT is: (AIIMS Nov 98)

- | | |
|------------|-------------|
| a. Stomach | b. Duodenum |
| c. Ileum | d. Rectum |

51. The commonest site of lymphoma in the gastrointestinal system is: (COMEDK 2007)

- | | |
|--------------------|--------------|
| a. Small bowel | b. Stomach |
| c. Large intestine | d. Esophagus |

52. In neuroblastoma the most common presentation is:

- | |
|---|
| a. Lytic lesion in skull with suture diastasis (All India 98) |
| b. Lung metastasis |
| c. Renal invasion |
| d. Secondaries in brain |

53. Commonest tumour of lumbar region in children is:

- | | |
|------------------|------------------|
| a. Dermoid cyst | b. Neuroblastoma |
| c. Wilm's tumour | d. Appendix |

SENTINEL LYMPH NODE BIOPSY

54. Sentinel lymph node biopsy is an important part of the management of which of the following conditions? (All India 2002)

- | | |
|-----------------------|--------------------------|
| a. Carcinoma prostate | b. Carcinoma breast |
| c. Carcinoma lung | d. Carcinoma nasopharynx |

55. True about sentinel lymph node biopsy: (PGI June 2004)

- | |
|---|
| a. Special OT is required |
| b. Blue dyes injected |
| c. Contraindicated if axillary LN is involved biopsy |
| d. It is done to avoid inadvertent axillary LN biopsy |
| d. Radioactive dye is used |

56. Sentinel lymph node biopsy is done in all except:

- | | |
|-----------------------|------------------------|
| a. CA breast | b. CA penis (DNB 2012) |
| c. Malignant melanoma | d. CA colon |

GI MALIGNANCY

57. Upper GI endoscopy and biopsy from lower esophagus in a 48 years old lady with chronic heart burn shows presence of columnar epithelium with goblet cells. The feature is most likely consistent with: (AIIMS June 2003)

- | | |
|----------------------|----------------|
| a. Dysplasia | b. Hyperplasia |
| c. Carcinoma in-situ | d. Metaplasia |

58. By mucosal resection which carcinoma can be diagnosed early: (AIIMS June 98)

- | | |
|-------------------------|-------------------------|
| a. Esophageal carcinoma | b. Anal carcinoma |
| c. Colon carcinoma | d. Pancreatic carcinoma |

59. In which case immunoguided surgery is done? (AIIMS June 98)

- | | |
|---------------|------------------|
| a. CA colon | b. CA pancreas |
| c. CA jejunum | d. CA anal canal |

SPONTANEOUS REGRESSION

60. In which case spontaneous regression is not seen? (AIIMS Sept 96, All India 98)

- | | |
|-----------------------|--------------------|
| a. Malignant melanoma | b. Osteosarcoma |
| c. Neuroblastoma | d. Choriocarcinoma |

61. Spontaneously regressing tumors are: (PGI June 2006)

- | |
|-----------------------|
| a. Malignant melanoma |
| b. Neuroblastoma |
| c. Ewing's sarcoma |
| d. Wilm's tumour |

62. Spontaneous regression of malignant tumor is feature of: (AIIMS June 93)

- | | |
|-----------------------|-------------------------|
| a. Neuroblastoma | b. Renal cell carcinoma |
| c. Burkitt's lymphoma | d. Wilm's tumor |

63. Tumor known to regress is: (PGI Dec 97)

- | | |
|-------------------|-------------------|
| a. Neuroblastoma | b. Retinoblastoma |
| c. Adenocarcinoma | d. CA breast |

RADIOTHERAPY

64. Most radio resistant phase in cell cycle:

(Recent Question 2014, JIPMER 2011)

- | | |
|-----------|------------|
| a. G_1 | b. Early S |
| c. Late S | d. G_2 |

65. All of the following are pure beta emitters except:

(AIIMS May 2011)

- | | |
|-----------------|------------------|
| a. Yttrium-90 | b. Phosphorus-32 |
| c. Strontium-90 | d. Samarium-153 |

66. All of the following radioisotopes are used as systemic radionuclide, except: (All India 2006)

- | | |
|------------------|-----------------|
| a. Phosphorus-32 | b. Strontium-89 |
| c. Iridium-192 | d. Samarium |

67. Phosphorus-32 emits:

(All India 2006)

- | | |
|-------------------|--------------------|
| a. Beta particles | b. Alpha particles |
| c. Neutrons | d. X-rays |

68. Which one of the following has the maximum ionization potential? (All India 2006)

- | | |
|---------------|-----------------|
| a. Electron | b. Proton |
| c. Helium ion | d. Gamma photon |

69. Which of the following malignant tumors is radioresistant? (All India 2006; AIIMS 2007)

- | | |
|--------------------|-------------------|
| a. Ewing's sarcoma | b. Retinoblastoma |
| c. Osteosarcoma | d. Neuroblastoma |

- 70. The most radiosensitive tumour among the following is:** (Recent Question 2014, All India 2006)
- Bronchogenic carcinoma
 - Carcinoma parotid
 - Dysgerminoma
 - Osteogenic sarcoma
- 71. Which of the following imaging techniques gives maximum radiation exposure to the patient?** (All India 2006)
- Chest X-ray
 - MRI
 - CT scan
 - Bone scan
- 72. The technique employed in radiotherapy to counteract the effect of tumor motion due to breathing is known as:** (All India 2005)
- Arc technique
 - Modulation
 - Gating
 - Shunting
- 73. Which one of the following radioisotope is not used as permanent implant?** (All India 2005)
- Iodine-125
 - Palladium-103
 - Gold-198
 - Caesium-137
- 74. Which of the following elements is obsolete in radiotherapy?** (AIIMS 2009)
- Cesium-137
 - Cobalt-60
 - Radium-226
 - Iridium-192
- 75. Craniospinal irradiation is employed in the treatment of:** (K GMC 2011, PGI 2009)
- Oligodendroglioma
 - Pilocytic astrocytoma
 - Mixed oligoastrocytoma
 - Medulloblastoma
 - Glioblastoma
- 76. Which of the following is the most radiosensitive phase of the cell cycle?** (MHCET 2016, AIIMS Nov 2012, All India 2008, PGI 2009, 2008)
- G₂M
 - G₂
 - S
 - G₁
- 77. Amifostine protects all of the following except:** (All India 2009)
- CNS
 - Salivary glands
 - Kidneys
 - GIT
- 78. Which of the following is the most radiosensitive tumor?** (Recent Question 2014, AIIMS Nov 2005)
- Ewing's sarcoma
 - Hodgkin's disease
 - Carcinoma cervix
 - Malignant fibrous histiocytoma
- 79. Which of the following radioactive isotopes is not used in brachytherapy?** (AIIMS 2005)
- Iodine-125
 - Iodine-131
 - Cobalt-60
 - Iridium-192
- 80. High energy linear accelerators use:** (PGI 2006)
- X-rays
 - Gamma-rays
 - Alpha-rays
 - Infrared-rays
 - β-rays
- 81. Ionizing radiation cause maximum damage in:** (PGI 2005)
- Hypoxic cells
 - Cells in S phase
 - Cells in G₂M phase
 - Dividing cells
 - Neurons
- 82. Which radionuclide is commonly used in teletherapy units?** (Orissa 2011)
- Radium-226
 - Cobalt-60
 - Caesium-137
 - Iridium-192
- 83. The half life of radioactive Cobalt-60 is:** (Orissa 2011)
- 2.26 years
 - 3.26 years
 - 5.26 years
 - 7.26 years
- 84. Amifostine is:** (AIIMS May 2012)
- Radiosensitiser
 - Radioprotector
 - Radiomodifier
 - Radiomimetic
- 85. Which of the following is radioprotective agent?** (All India 2012)
- Cisplatin
 - Amifostine
 - Methotrexate
 - Colony stimulating factor
- 86. For which malignancy, intensity modulated radiotherapy (IMRT) is the most suitable:** (AIIMS Nov 2005)
- Lung
 - Prostate
 - Leukemia
 - Stomach

MISCELLANEOUS

- 87. Which of the following malignant disease of children has the best prognosis?** (AIIMS Nov 2003)
- Wilm's tumor
 - Neuroblastoma
 - Rhabdomyosarcoma
 - Primitive neuroectodermal tumor
- 88. Neoadjuvant chemotherapy is not used in:** (AIIMS Feb 97)
- CA thyroid
 - CA breast
 - CA esophagus
 - CA lung
- 89. Which of the following is the most beneficial technique of using chemotherapy with a course of radiotherapy in head and neck malignancies?** (AIIMS Nov 2004)
- Neo adjuvant chemotherapy
 - Adjuvant chemotherapy
 - Concurrent chemotherapy
 - Alternating chemotherapy and radiotherapy
- 90. Migratory thrombophlebitis is associated with the following malignancies except:** (AIIMS Nov 2004)
- Lung cancer
 - Prostate cancer
 - Pancreas cancer
 - Gastro-intestinal cancer
- 91. Small deposits of neuroendocrine cell hyperplasia in scarred lungs are known as:** (JIPMER 2014)
- Teratoma
 - Tumor let
 - Carcinoid
 - Hamartoma
- 92. The most common malignant tumor of adult males in India is:** (All India 2004)
- Oropharyngeal carcinoma
 - Gastric carcinoma
 - Colo-rectal carcinoma
 - Lung cancer
- 93. Most common cancer in India:** (All India 97)
- CA cervix
 - CA breast
 - CA lung
 - CA oral cavity
- 94. Trousseau's sign is seen in all the following except:** (All India 94)
- CA lung
 - CA Stomach
 - CA Pancreas
 - Liposarcoma
- 95. Pseudolymphoma is seen in:** (PGI Dec 97)
- Sjogren's syndrome
 - SLE
 - Mixed connective tissue disease
 - Behcet's syndrome
- 96. Pancoast tumour is seen with cancer of:** (PGI Dec 99)
- Apical lobe of lung
 - Lingual lobe
 - Thyroid
 - Pyrimiform fossa
- 97. Erythema chronicum migrans is seen in:** (PGI June 99)
- Lyme's disease
 - Glucagonoma
 - Gastrinoma
 - Pheochromocytoma

98. All of the following are examples of round cell tumour, except: (AIIMS Nov 2005)
- Neuroblastoma
 - Ewing Sarcoma
 - Non-Hodgkin's lymphoma
 - Osteosarcoma
99. RET proto-oncogene mutation is a hallmark of which of the following tumors?
- Medullary carcinoma thyroid
 - Astrocytoma
 - Paraganglioma
 - Hurthle cell tumor thyroid
100. All are correctly matched except: (PGI June 2006)
- BRCA-1: Lung
 - BCL-2: Apoptosis
 - Chromosome 16: Philadelphia chromosome
 - APC gene: Colon
101. Adjuvant chemotherapy is of definite value in: (AIIMS Nov 2006)
- CA colon
 - CA pancreas
 - CA gallbladder
 - CA esophagus
102. Which of the following tumors are surgically curative? (PGI 88)
- Pheochromocytoma
 - Insulinoma
 - Glucagonoma
 - Appendicular carcinoid
 - All
103. Which is not having underlying malignancy? (APPG 2008)
- Paget's disease of bone
 - Paget's disease of nipple
 - Paget's disease of vulva
 - Paget's disease of anal region
104. Glomus tumor is seen in: (Recent Question 2014, AIIMS Nov 2008)
- Liver
 - Adrenals
 - Pituitary
 - Finger
105. BRCA-1 gene is located on: (Recent Question 2014, AIIMS May 2011)
- Chromosome 13
 - Chromosome 11
 - Chromosome 17
 - Chromosome 22
106. A 24 years old man presented with retroperitoneal, necrotic, heterogenous enhancing mass on CT near the hilum of the left kidney. What is the most probable diagnosis? (AIIMS Nov 2010)
- Metastatic germ cell tumour
 - Metastatic melanoma
 - Lymphoma
 - Metastatic transitional cell tumour
107. Octreotide is used in all except: (AIIMS May 2011)
- Insulinoma
 - Glucagonoma
 - Glioma
 - Carcinoids
108. Feature(s) of hamartoma is/are: (PGI Nov 2011)
- Benign
 - Malignant
 - Malformation
 - Mostly Asymptomatic
109. Most common site of carcinoma in India? (MHPGMCET 2001)
- Lung
 - Oral cavity
 - Breast
 - Uterus
110. National Cancer Control Programme (NCCP) launched in India in the year: (Orissa 2011)
- 1975
 - 1982
 - 1985
 - 1992
111. Acanthosis nigricans is seen in: (DNB 2009)
- GI malignancy
 - Lung cancer
 - Breast cancer
 - All of the above
112. Smoking is a risk factor for all cancer except: (DNB 2007)
- Esophagus
 - Urinary bladder
 - Pancreas
 - Gallbladder
113. Most common Non-Hodgkin's lymphoma of orbit: (AIIMS May 2013)
- B cell
 - T cell
 - NK cell
 - Plasma cell

EXPLANATIONS

TUMOR MARKERS

1. Ans. c. CEA (Ref: Harrison 18/e p652; Schwartz 9/e p444-445; Sabiston 19/e p712-716)

Page's disease of nipple is differentiated by superficial spreading melanoma by CEA positivity^Q.

Markers	Associated Cancers	Non-neoplastic Conditions
Hormones		
<ul style="list-style-type: none"> Human chorionic gonadotropin Calcitonin Catecholamines 	<ul style="list-style-type: none"> Trophoblastic tumors^Q, nonseminomatous testicular tumors Medullary carcinoma^Q of thyroid Pheochromocytoma^Q 	<ul style="list-style-type: none"> Pregnancy
Oncofetal Antigens		
<ul style="list-style-type: none"> Alpha-Fetoprotein CEA 	<ul style="list-style-type: none"> Liver^Q cell cancer, nonseminomatous germ cell tumor of testis, lung^Q cancer Adenocarcinoma of the colon^Q, pancreas^Q, lung^Q, breast^Q, ovary^Q, prostate^Q 	<ul style="list-style-type: none"> Cirrhosis, hepatitis Pancreatitis, hepatitis, inflammatory bowel disease, smoking
Isoenzymes		
<ul style="list-style-type: none"> Prostatic acid phosphatase Neuron-specific enolase Lactate dehydrogenase 	<ul style="list-style-type: none"> Prostate cancer Small cell cancer of lung^Q, Neuroblastoma^Q Lymphoma, Ewing sarcoma 	<ul style="list-style-type: none"> Prostatitis, prostatic hypertrophy Hepatitis, hemolytic anemia, many others
Specific proteins		
<ul style="list-style-type: none"> Immunoglobulins PSA and prostate specific membrane antigen 	<ul style="list-style-type: none"> Multiple myeloma^Q and other gammopathies Prostate cancer^Q 	<ul style="list-style-type: none"> Infection, MGUS Prostatitis, prostatic hypertrophy^Q
Mucins and other Glycoproteins		
<ul style="list-style-type: none"> CA-125 CA-19-9 CD30 CD25 	<ul style="list-style-type: none"> Cancer of ovary^Q, fallopian tube, endometrium^Q, cervix, breast^Q, lung^Q, pancreas^Q and colon^Q Colon^Q cancer, pancreatic^Q cancer Hodgkin's disease^Q, anaplastic large cell lymphoma Hairy cell leukemia, adult T cell leukemia/lymphoma^Q 	<ul style="list-style-type: none"> Pregnancy^Q, endometriosis^Q, PID^Q, uterine fibroids^Q Pancreatitis, Ulcerative colitis

2. Ans. c. Hepatocellular carcinoma

3. Ans. b. Hepatoma, c. RCC (Ref: Harrison 18/e p831)

Erythropoietin Secreting Tumors	
<ul style="list-style-type: none"> Renal cell carcinoma^Q Hepatocellular carcinoma^Q 	<ul style="list-style-type: none"> Cerebellar hemangioblastoma^Q Massive uterine leiomyoma^Q

4. Ans. a. Screening of a cancer, b. Follow up a cancer patient, especially for knowing about recurrence, d. For monitoring the treatment of a cancer (Ref: Harrison 18/e p652; Sabiston 19/e p712-716)

TUMOR MARKERS

- Tumor markers are indicators of cellular, biochemical, molecular, or genetic alterations by which neoplasia can be recognized^Q.
- These surrogate measures of the biology of the cancer provide insight into the clinical behavior of the tumor^Q.
- This is particularly useful when the cancer is not clinically detectable^Q.
- The information provided may:
 - Be diagnostic and distinguish benign from malignant disease^Q
 - Correlate with the amount of tumor present (so-called tumor burden^Q)
 - Allow subtype classification to more accurately stage patients^Q
 - Be prognostic, either by the presence or absence of the marker or by its concentration^Q
 - Guide choice of therapy and predict response to therapy^Q

5. Ans. a. Cerebellar hemangioblastoma, b. Hepatoma, c. Renal cell carcinoma, e. Fibromyoma of uterus
6. Ans. a. Colon carcinoma, b. Breast carcinoma, c. Ovarian carcinoma, d. Bronchogenic carcinoma, e. Pancreatic carcinoma
7. Ans. a. Pregnancy, b. Breast carcinoma, d. Endometrial carcinoma, e. Endometriosis
8. Ans. a. Adenocarcinoma of colon, b. Pancreatic carcinoma, d. Ovarian carcinoma, e. Prostatic carcinoma
9. Ans. b. HCC, c. CA Lung
10. Ans. b. Metastatic carcinoma of liver
11. Ans. a. Cytokeratin (Ref: Robbins 8/e p324)

SCREENING IMMUNOHISTOCHEMISTRY

- Epithelial Markers: Cytokeratin (positive in carcinomas)^Q
 - Lymphoid Markers: CD-45 (positive in lymphoma)^Q
 - Melanocytic Markers: S-100 (positive in melanoma)^Q
 - Mesenchymal Markers: Vimentin (positive in sarcoma)^Q
 - Neuroendocrine Markers: Chromogranin and neuron specific enolase^Q
12. Ans. b. Seminoma of the testes
 13. Ans. None
 14. Ans. d. Osteogenic sarcoma
 15. Ans. d. Elevated only when there is hepatic metastasis

SCREENING IN MALIGNANCY

16. Ans. c. Colon cancer (Ref: Harrison 18/e p659-662; Schwartz 9/e p252; Bailey 25/e p97-98)

Schwartz says "Because the majority of colorectal cancers are thought to arise from adenomatous polyps, preventive measures focus upon identification and removal of these premalignant lesions. In addition, many cancers are asymptomatic and screening may detect these tumors at an early and curable stage."

American Cancer Society Recommendations for Early Detection of Cancer in Average-Risk, Asymptomatic Individuals			
Cancer Site	Population	Test or Procedure	Frequency
Breast	Women aged ≥ 20 years	<ul style="list-style-type: none"> • Breast self-examination • Clinical breast examination • Mammography 	<ul style="list-style-type: none"> • Monthly, starting at age 20 • Every 3 years, ages 20–39 • Annual, starting at age 40^Q • Annual, starting at age 40^Q
Colorectal	Men and women aged ≥ 50 years	<ul style="list-style-type: none"> • Fecal occult blood test (FOBT) or fecal immunochemical test (FIT) • Flexible sigmoidoscopy^Q • FOBT and flexible sigmoidoscopy^Q • Double-contrast barium enema (DCBE)^Q • Colonoscopy^Q 	<ul style="list-style-type: none"> • Annual, starting at age 50^Q • Every 5 years, starting at age 50 • Annual FOBT (or FIT) and flexible sigmoidoscopy every 5 years, starting at age 50^Q • DCBE every 5 years, starting at age 50^Q • Colonoscopy every 10 years^Q, starting at age 50
Prostate	Men aged ≥ 50 years	<ul style="list-style-type: none"> • Digital rectal examination (DRE) and prostate-specific antigen (PSA) test^Q 	<ul style="list-style-type: none"> • Offer PSA test and DRE annually, starting at age 50, for men who have life expectancy of at least 10 years
Cervix	Women aged ≥ 18 years	<ul style="list-style-type: none"> • Pap test^Q 	<ul style="list-style-type: none"> • Cervical cancer screening beginning 3 years after first vaginal intercourse, but no later than age 21 years
Endometrial	Women at menopause	—	<ul style="list-style-type: none"> • At the time of menopause, women at average risk should be informed about the risks and symptoms of endometrial cancer

17. Ans. b. Colon
18. Ans. b. Carcinoma Breast, d. Carcinoma Cervix
19. Ans. d. Lung

Well Established Benefit of Screening in	
<ul style="list-style-type: none"> • Colorectal cancer^Q • CA cervix^Q 	<ul style="list-style-type: none"> • CA oral cavity^Q • CA breast^Q

LYMPH NODE METASTASIS

20. Ans. b. Nasopharyngeal carcinoma (Ref: Sabiston 19/e p808-810; Schwartz 10/e 580, 593-594, 9/e p502; Bailey 26/e p681-683, 25/e p709-710; Devita 9/e p764-766)

NASOPHARYNGEAL CARCINOMA

- MC tumor to produce cervical LN metastasis^Q
- MC tumor responsible for secondaries in the neck with no obvious primary malignancy^Q

21. Ans. c. Hard palate (Ref: Bailey 25/e p734, 738; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p288-289)

- LN metastasis is most common in: CA tongue^Q > Floor of mouth > Lower alveolus > Buccal mucosa > Upper alveolus > Hard palate > Lip^Q.

22. Ans. a. Pretracheal (Ref: Bailey 25/e p967, 977)

Important Lymph Nodes	
Rotter's nodes ^Q	• Interpectoral nodes (CA breast) ^Q
Rouvier nodes ^Q	• Retropharyngeal nodes (CA Nasopharynx) ^Q
Delphian nodes ^Q	• Pre-cricoid/Pre-tracheal/Pre-laryngeal lymph nodes ^Q
Irish nodes ^Q	• Nodes in left axilla (CA stomach) ^Q
Sister Mary Joseph nodes ^Q	• Periumbilical metastatic cutaneous nodules
Virchow nodes ^Q	• Left supraclavicular node ^Q
Cloquet node ^Q	• Femoral canal node ^Q
LN of Lund ^Q	• Cystic lymph node ^Q
Krouse Lymph node	• Jugular fossa lymph node ^Q

23. Ans. d. Excision biopsy of the node (Ref: Harrison 18/e p467)

- Harrison says "In cases of lymphadenopathy, if the patient history and physical findings are suggestive of malignancy, then a prompt lymph node biopsy should be done. FNAC is not of much use, as it does not provide enough tissue to reach a diagnosis."

24. Ans. c. Lung carcinoma (Ref: Harrison 18/e p738; Sabiston 19/e p1573; Schwartz 10/e 623-645, 9/e p529; Devita 9/e p799-812)

- SCC is a variant of lung cancer, rest three options are most commonly adenocarcinoma.

25. Ans. a. Undertake an open biopsy of the neck lump

26. Ans. b. Posterior tongue

27. Ans. b. Angiosarcoma (Ref: Harrison 18/e p817-820; Sabiston 19/e p768-774)

- MC site of metastasis in sarcomas of extremity: Lungs^Q
- MC site of metastasis in retroperitoneal sarcomas: Liver^Q
- LN metastasis is uncommon in soft tissue sarcoma^Q.

Sarcomas with Lymph Node Metastasis (MARCES)

- | | |
|--|--|
| <ul style="list-style-type: none"> • Malignant fibrous histiocytoma^Q • Angiosarcoma^Q • Rhabdomyosarcoma^Q | <ul style="list-style-type: none"> • Clear cell sarcoma^Q • Epithelial sarcoma^Q • Synovial sarcoma^Q |
|--|--|

BONE METASTASIS

28. Ans. b. Prostate (Ref: Harrison 18/e p820-821; Devita 9/e p2512-2513; CSDT 12/e p1202; Apley 9/e p216)

- MC site of primary for bone metastasis: CA Breast > CA prostate > RCC > CA lung > CA thyroid > CA bladder
- MC cause of osteoblastic secondaries in males: CA Prostate^Q
- MC cause of osteoblastic secondaries in females: CA Breast^Q
- MC tumor metastasize to bone in females: CA Breast^Q
- Lytic expansile metastasis is seen in: RCC follicular carcinoma thyroid
- MC site of bone metastasis: Dorsal spine

BONE METASTASIS

- Metastatic tumors of bone are more common than primary bone tumors^Q.
- Tumors usually spread to bone hematogenously, axial skeleton is seeded more than appendicular skeleton partly due to persistence of red marrow^Q.

- In order of decreasing frequency, the sites most often involved are vertebrae (most common)^Q > proximal femur > pelvis > ribs > sternum > proximal humerus > skull.
- Extremities distal to elbow and knee are least commonly involved sites^Q, but if distal extremity is involved there is high probability of myeloma^Q.
- Metastasis to small bones originate from: Lung, kidney or colon^Q

- Bone is a common site of metastasis for carcinoma of the prostate, breast, lung, kidney, bladder, thyroid, lymphomas and sarcomas^Q.
- Bateson's vertebral plexus allow cells to enter the vertebral circulation without first passing through the lungs and is responsible for high rate of prostate cancer metastasis to bone^Q.

Diagnosis

- Bone scan is investigation of choice for bone metastasis^Q.
- Purely osteolytic lesions are best detected by plain radiography, but they are not apparent until they are >1 cm and have destroyed 30-50% of bone^Q.
- These are associated with hypercalcemia and with the excretion of hydroxyproline containing peptides^Q.

Treatment

- Treatment options: Bisphosphonates, corticosteroids, radiotherapy (EBRT) and radionucleotides.
- EBRT is given in symptomatic bony metastasis^Q.
- Samarium-153, is a beta emitter, very effective in relieving pain of bone metastasis^Q.

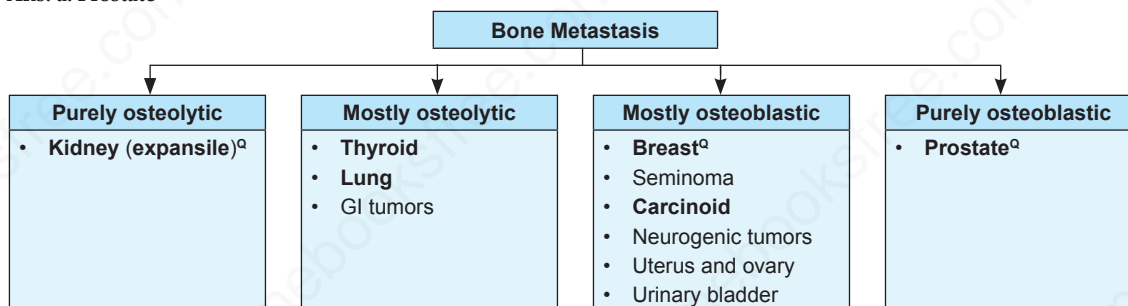
29. Ans. a. Samarium-153

30. Ans. c. Bone scan (Ref: Sutton 7/e p1251)

31. Ans. c. CA testis

32. Ans. d. Soft tissue sarcoma causes bony metastasis

33. Ans. a. Prostate



34. Ans. a. Kidney

PULSATING SECONDARIES

- Follicular carcinoma thyroid^Q
- RCC^Q

35. Ans. b. Neuroblastoma (Ref: Schwartz 10/e 678,1639-1640, 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591; Nelson's 18/e p2138)

NEUROBLASTOMA

- Metastasis is present in 60-70% of patients at the time of diagnosis^Q
- Common sites of metastasis: Long bones (MC)^Q, Liver, Lymph nodes and Skin
- Lung metastasis is rare in neuroblastoma^Q
- Neuroblastoma is the MC extracranial solid tumor in childhood^Q
- Neuroblastoma is the 2nd MC solid malignancy of childhood after brain tumors^Q
- MC intra abdominal solid tumor in childhood: Neuroblastoma^Q

36. Ans. d. Multiple myeloma

37. Ans. d. Forearm and leg bones

38. Ans. d. Secondary from prostate

39. Ans. a. Lung (Ref: Bailey 24/e p1330)

- "Prostate, breast and lung primaries account for 80% of all bone metastasis."

ONCOLOGICAL EMERGENCIES

40. Ans. a. Hypocalcemia (Ref: Harrison 18/e p2274; Schwartz 10/e 72,78, 9/e p65; Sabiston 19/e p113)

TUMOR LYSIS SYNDROME

- Caused by **destruction** of large number of **rapidly proliferating neoplastic cells**^Q
- Frequently, **acute renal failure** develops as a result of the syndrome^Q.
- **Most frequently associated** with the treatment of **Burkitt's lymphoma**, **ALL** and other **high grade lymphomas**^Q, **chronic leukemias** and rarely with solid tumors.

Pathophysiology

- **Hyperuricemia**: Due to destruction of malignant cells and rapid turnover of nucleic acid
- **Hyperkalemia**: Due to release of intracellular K leading to arrhythmia.
- **Hyperphosphatemia** and **Hypocalcemia**: Due to **release of intracellular phosphate**, which combines with calcium into bone, calcium phosphate gets **deposited in renal tubules** causing **renal failure**^Q.
- **Lactic acidosis**: Due to **deranged oxidative metabolism**^Q

Characteristic Abnormalities of Tumor Lysis Syndrome

<ul style="list-style-type: none"> • Hyperuricemia^Q • Hyperkalemia^Q • Hyperphosphatemia^Q 	<ul style="list-style-type: none"> • Lactic acidosis^Q • Hypocalcemia^Q
---	---

Treatment

- **Hydration**, **NaHCO₃**, **Allopurinol**, **Rasburicase** (recombinant urate oxidase), **Hemodialysis**^Q

41. Ans. a. Hyperuricemia, d. Hyperphosphatemia, e. Hyperkalemia

42. Ans. b. Hypercalcemia

43. Ans. b. Hypercalcemia

44. Ans. b. PTH-rp (Ref: Harrison 18/e p3111)

HYPERCALCEMIA OF MALIGNANCY

- **Main factor** leading to hypercalcemia is either **increased release of calcium from bone** or **increased calcium reabsorption from DCT**^Q.
- Mostly **underlying cause** is **secretion of PTH-rp**^Q.

Treatment

- **Mainstay of therapy**: **Rehydration** with a **0.9% saline** and diuresis with **furosemide**^Q
- Other drugs used to lower serum calcium levels:
 - **Bisphosphonates** (**Zoledronic acid** is **DOC**), **Calcitonin**^Q
 - **Mithramycin** (plicamycin), **Gallium nitrate**^Q
 - **Glucocorticoids** (**Hydrocortisone**)^Q

45. Ans. None

46. Ans. d. Neutropenic colitis (Ref: Harrison 18/e p2276-2277; Schwartz 10/e 1236, 1241, 9/e p1070, 1074; Bailey 26/e p206, 25/e p1211)

TYPHLITIS (NEUTROPENIC ENTEROCOLITIS)

- Also referred to as **necrotizing colitis**, **ileocecal syndrome** and **cecitis**^Q
- **Classically seen** in **neutropenic patients after chemotherapy**^Q with cytotoxic drugs.
- **More common** among **children**^Q than among adults
- **More common** among patients with **acute myelocytic leukemia (AML)** or **ALL**^Q

Clinical Features

- Clinical syndrome of **fever** and **right-lower-quadrant tenderness** in an **immunosuppressed host**^Q.
- Associated **diarrhea** (often **bloody**) is common

Diagnosis

- Diagnosis can be confirmed by the finding of a **thickened cecal wall** on **CT** or **USG**^Q.

Treatment

- **Most cases resolve** with **medical therapy** alone^Q.
- **Surgical intervention**: If there is **no improvement** by **24 hours** after start of antibiotic treatment and in **perforation**^Q

47. Ans. a. Hyperuricemia, b. Hyperkalemia, e. Hyperphosphatemia

48. Ans. b. Small cell carcinoma (Ref: Harrison 18/e p2266; 17/e p554)

SUPERIOR VENA CAVA (SVC) SYNDROME

- Clinical manifestation of SVC obstruction, with severe reduction in venous return from head, neck and upper extremities.
- **MC cause is Lung cancer (small cell and squamous cell carcinoma)^Q**, alongwith **lymphoma** and **metastatic tumors** responsible for more than 90% of all SVC syndrome.
- **In young adults, malignant lymphoma is the leading cause of SVC syndrome^Q.**

Clinical Features

- Patients present with **neck and facial swelling** (especially around the eyes), **dyspnoea**, and **cough^Q**.
- Other symptoms include hoarseness, tongue swelling, headache, nasal congestion, epistaxis, dysphagia, pain, dizziness, syncope.
- **Characteristic physical findings are dilated neck veins, increased number of collateral veins covering the anterior chest wall, cyanosis, and edema of the face, arms and chest^Q.**

Diagnosis

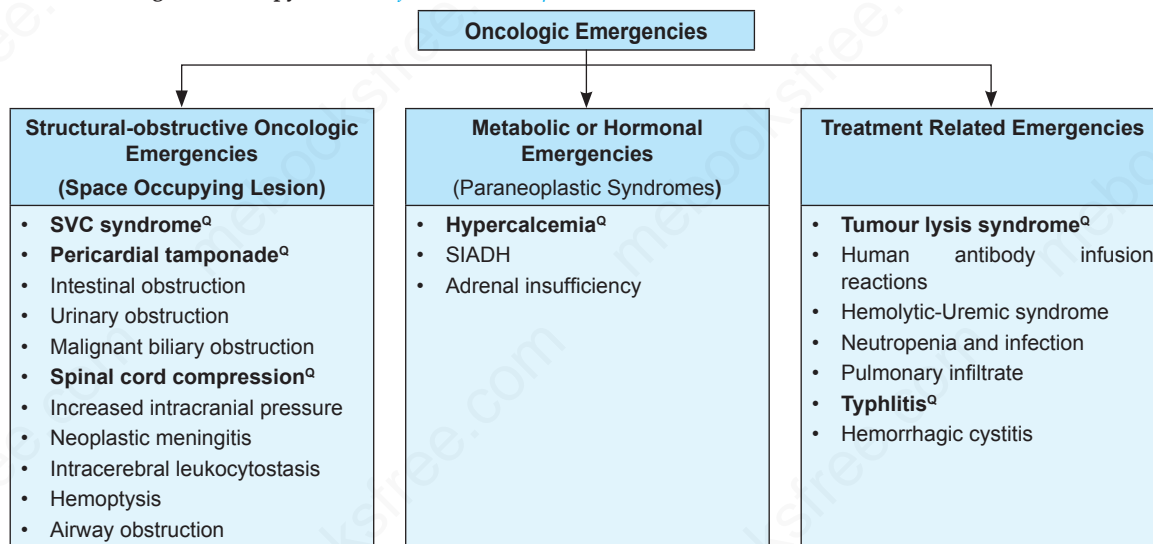
- Most significant chest radiographic finding is **widening of the superior mediastinum (MC right side)^Q**
- **CT scan: Investigation of choice^Q.**

Treatment

- Potentially life threatening complication of **superior mediastinal mass is tracheal obstruction^Q.**
- Diuretics with low salt diet, head elevation and oxygen may produce temporary symptomatic relief.

Treatment	Underlying cause
Radiation Therapy ^Q	Non-small cell lung cancer, Metastatic solid tumors
Chemotherapy ^Q	Small cell carcinoma or lymphoma
Surgery ^Q	All other cases

49. Ans. d. CA cervix stage IIIb with pyometra (Ref: Harrison 18/e p2266-2277)

**LYMPHOMA**

50. Ans. a. Stomach (Ref: Sabiston 19/e p1218-1219; Schwartz 10/e 1259, 9/e p935-937; Bailey 26/e p1160, 25/e p1075; Shackelford 7/e p1035-1042)

GI LYMPHOMA

- **MC site for lymphoma^Q in the GIT: Stomach > Ileum**
 - **MC site of gastric lymphoma: Antrum^Q**
- | |
|---|
| <ul style="list-style-type: none"> • MC type of gastric lymphoma: Diffuse large B-cell lymphoma^Q (55%) > MALToma (40%) • DLBL is MC type of NHL, extranodal lymphoma and GI lymphoma. |
|---|

51. Ans. b. Stomach

52. Ans. a. Lytic lesion in skull with suture diastasis

53. Ans. b. Neuroblastoma

SENTINEL LYMPH NODE BIOPSY

54. Ans. b. Carcinoma breast (Ref: Harrison 18/e p690, 729; Schwartz 10/e 305-306, 545-547, 9/e p259, 416; Sabiston 19/e p753, 851)

SENTINEL LYMPH NODE BIOPSY

- SLN biopsy is usually done in: CA breast^Q, CA penis^Q and Malignant melanoma^Q
- No special OT is required^Q
- SLN biopsy is usually done intraoperatively by using isosulphan blue dye (lymphazurin) or radioactive (Tc-99 labelled sulphur) colloid. Accuracy of detection of SLN biopsy is best when both of the methods are combined^Q.
- When radioactive colloid is used, the SLN is detected by gamma-camera
- The blue dye colors the afferent lymphatics and SLN, hence aids in the identification

Contraindication of SLN Biopsy in CA Breast

1. Palpable lymphadenopathy^Q
2. Prior axillary surgery, chemotherapy or radiotherapy^Q
3. Multifocal breast cancer^Q

55. Ans. b. Blue dyes injected

56. Ans. d. CA colon

GI MALIGNANCY

57. Ans. d. Metaplasia (Ref: Sabiston 19/e p1033-1036; Schwartz 10/e 1017-1018, 9/e p831-832; Bailey 26/e p1001, 25/e p1022-1024; Shackelford 7/e p285, 294)

BARRETT'S ESOPHAGUS

- Metaplasia of esophageal squamous epithelium into columnar in distal^Q esophagus
- It is consequence of severe reflux esophagitis^Q
- MC type of columnar epithelium is intestinal epithelium (Intestinal metaplasia^Q)

58. Ans. a. Esophageal carcinoma (Ref: Schwartz 10/e 1008-1009, 9/e p866; Sabiston 19/e p1053)

ENDOSCOPIC MUCOSAL RESECTION (IN CA ESOPHAGUS)

- EMR provides essential staging information that guides treatment^Q.
- It may also be used as a therapeutic modality for premalignant and early malignant conditions^Q.

59. Ans. a. CA colon (Ref: www.ncbi.nlm.nih.gov/pubmed/11775180)

RADIO-IMMUNOGUIDED SURGERY FOR COLORECTAL CANCER

- The intra-operative detection of metastatic disease in colorectal cancer depends on tumor-associated antigen and antibodies as well as detection technology (A hand-held gamma detecting probe)^Q.

SPONTANEOUS REGRESSION

60. Ans. b. Osteosarcoma (Ref: Robbins 8/e p478, 966, 1059, 1172, 1365)

Tumors with Spontaneous Regression (NCR MR)	
<ul style="list-style-type: none"> • Neuroblastoma^Q • Choriocarcinoma^Q • Renal cell carcinoma^Q 	<ul style="list-style-type: none"> • Malignant melanoma^Q • Retinoblastoma^Q

61. Ans. a. Malignant melanoma, b. Neuroblastoma

62. Ans. a. Neuroblastoma, b. Renal cell carcinoma

63. Ans. a. Neuroblastoma, b. Retinoblastoma

RADIOTHERAPY

64. Ans. c. Late S (Ref: Harrison 18/e p691-692; Schwartz 10/e 313-314, 9/e p264-265)

- Radiation energy is absorbed by tissue causing **ionization** or **excitation**^Q, which are responsible for various biological effects.
- Susceptibility of various phases of cell cycle to radiation: $G_2M^Q > G_2 > M > G_1 > \text{Early S} > \text{Late S Phase}^Q$.

Phase of Cell Cycle	Comment
$G_2M > G_2$	• Most sensitive ^Q to radiation
End of S phase	• Most resistant ^Q to radiation
G_1	• Radiation exposure leads to chromosomal aberration
G_2	• Radiation exposure leads to chromatid aberration

65. Ans. d. Samarium-153 (Ref: Harrison 18/e p691-692)

Pure Beta Emitters	
• Strontium (Sr)-90 ^Q	• H-3 (Tritium) ^Q
• Yttrium (Y)-90 ^Q	• Phosphorus (P)-32 ^Q

66. Ans. c. Iridium-192 (Ref: Principle and Practice of Radiation Oncology (Lippincott) 4/e p637; Harrison 18/e p692)

SYSTEMIC RADIONUCLIDES

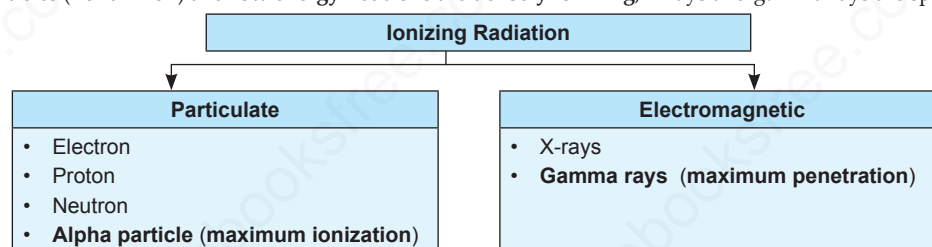
- Systemic radionuclides are **non-sealed** radionuclides which are administered orally, intravenously or intracavitary.
- Before administering it, **pregnancy** should be **ruled out**
- Breast feeding should be **discontinued** for 1–2 weeks.

Types	T _{1/2} (days)	Decay particles	Use
Sodium iodide (I ¹³¹) ^Q	8 ^Q	Gamma, beta ^Q	Hyperthyroidism (diffuse toxic goiter, toxic multinodular goiter, or solitary toxic thyroid nodule), thyroid carcinoma ^Q
Sodium phosphate (P ³²) Colloidal chromic Phosphate	14.3	Beta ^Q	Myeloproliferative disorders (Polycythemia and thrombocytosis ^Q) Intra-cavitary therapy of malignant ascites , malignant pleural effusion and brain cyst ^Q
Samarium-153 (Sm) chloride	1.9	Beta ^Q	Painful bone metastases ^Q
Strontium-89 (Sr) chloride	50.5	Beta ^Q Never gamma	Painful bone metastases ^Q
Rhenium (Re)	3.8	Beta and Gamma	Painful bone metastases ^Q

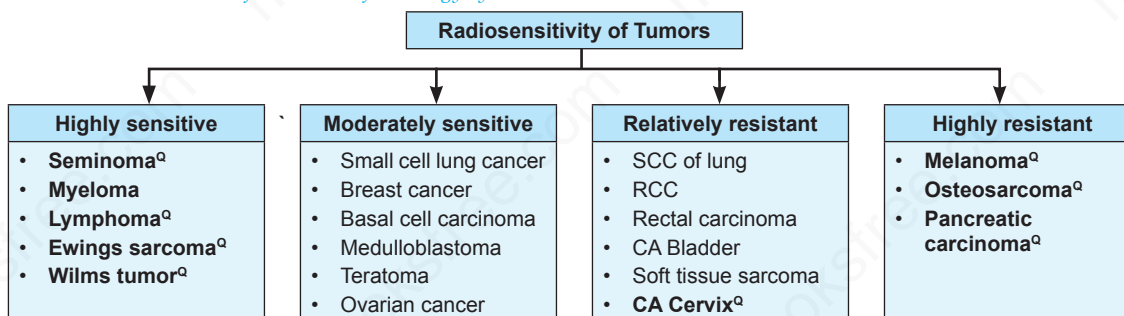
67. Ans. a. Beta particles

68. Ans. c. Helium ion (Ref: Harrison 18/e p691-692)

Alpha particles (helium ion) and low energy neutrons are densely ionizing; X-rays and gamma rays are sparsely ionizing.



69. Ans. c. Osteosarcoma (Ref: Essentials of Radiology by Bhaduri/502)



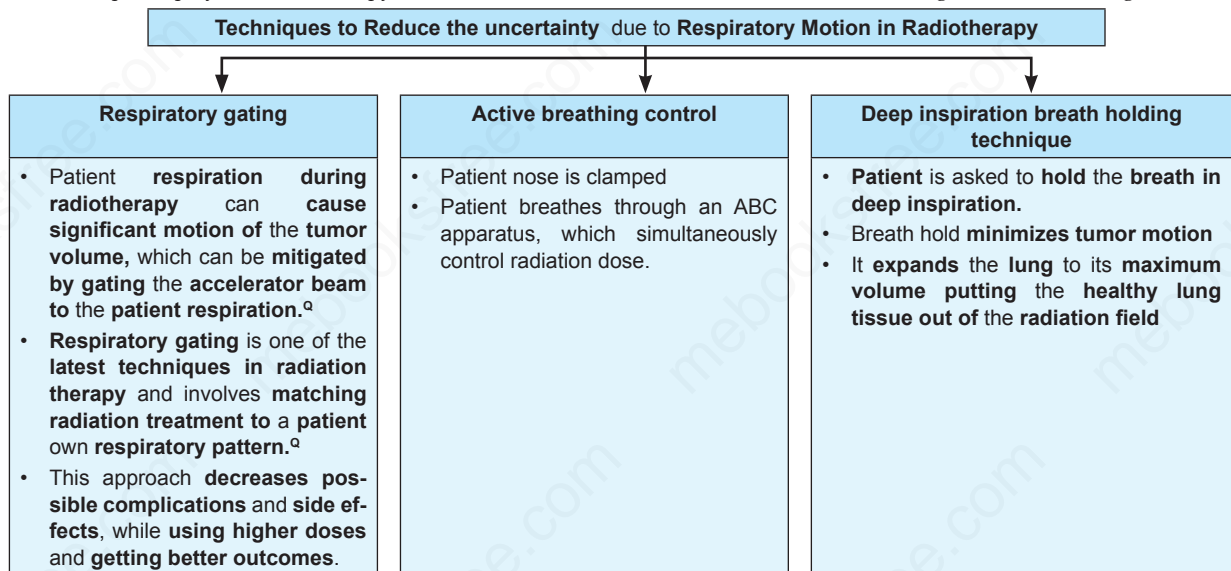
70. Ans. c. Dysgerminoma

71. Ans. c. CT scan (Ref: Bailey 25/e p130)

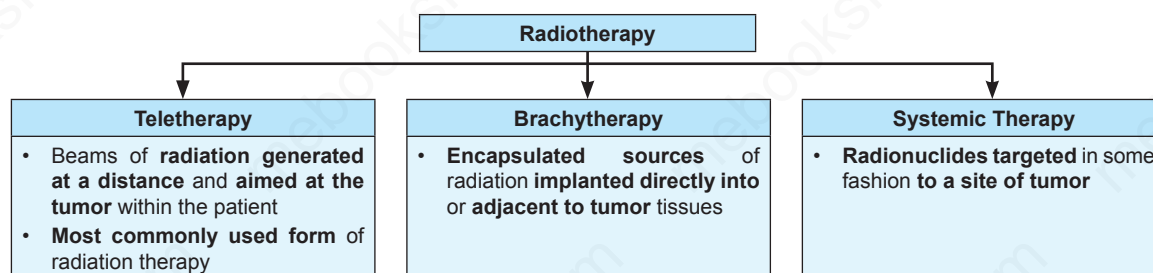
Diagnostic procedure	Typical effective dose (mSv)	Equivalent no. of chest radiographs
Radiographic examinations		
Limbs and joints (except hip)	< 0.01	< 0.5
Chest (single PA film)	0.02	1
Skull	0.07	3.5
Thoracic spine	0.7	35
Lumbar spine	1.3	65
Hip	0.3	15
Pelvis	0.7	35
Abdomen	1.0	50
Intravenous urography	2.5	125
Barium swallow	1.5	75
Barium meal	3	150
Barium follow-through	3	150
Barium enema	7	350
CT head	2.3	115
CT chest	8	400
CT abdomen or pelvis	10	500
Radionuclide studies		
Lung ventilation (¹³³ Xe)	0.3	15
Lung perfusion (^{99m} Tc)	1	50
Kidney (^{99m} Tc)	1	50
Thyroid (^{99m}Tc)	1	50
Bone (^{99m}Tc)	4	200
Dynamic cardiac (^{99m} Tc)	6	300
PET head (¹⁸F-FDG)	5	250

72. Ans. c. Gating (Ref: Radiation oncology by Leibe Phillips 2nd/192-192)

The technique employed in radiotherapy to counteract the effect of tumour motion due to breathing is known as Gating.

73. Ans. d. Caesium-137 (Ref: Washington and Lever Principle of Radiotherapy 2nd/326; Harrison 18/e p691-692)

- Cs-137 is not used as permanent implant, it is used as temporary interstitial implant.

**BRACHYTHERAPY**

- Radiation therapy with encapsulated source of radiation implanted directly into or adjacent to tumor tissue.
- It is delivered in two ways (1) Intracavitary implants^Q (2) Interstitial implants
- Interstitial implantation is of two types:
 - Permanent implants (PGI)^Q: Pd-103^Q, Gold (Au)-198^Q, I-125^Q
 - Temporary implants (ICT)^Q: Ir-192^Q, Cs-137^Q (Temporary)
- Normal tissues are spared from radiation injury^Q.

Interstitial implants

Permanent Interstitial Implants (PGI)	Temporary Interstitial Implants (ICT)
<ul style="list-style-type: none"> Performed when the tumor to be treated is inaccessible making the removal of radioisotope impossible or impractical. These implants have usually short half lives. Isotopes used (PGI): <ul style="list-style-type: none"> Palladium (Pd) 103^Q Gold (Au) 198^Q Iodine 125^Q Used in deep seated lesion in pelvis, abdomen, lung, colorectum 	<ul style="list-style-type: none"> Temporary removable implants are used in anatomic areas where there is no body cavity or orifice to accept radioactive sources. Isotopes used (ICT): <ul style="list-style-type: none"> Iridium 192 (MC)^Q Cesium 137^Q (ICT: Iridium cesium temporary) Used in breast and chest wall irradiation, anterior, lateral and posterior wall of vagina

74. Ans. c. Radium-226 (Ref: Text Book of Radiation Oncology by Leibel Philips 2nd/231)

RADIUM-226

- Radium-226 is not used anymore because of:
 - Longest half life among all isotopes
 - Emits alpha and gamma rays, which is the most dangerous combination
 - Produces radon, a radioactive inert gas, which is difficult to remove

75. Ans. d. Medulloblastoma, e. Glioblastoma (Ref: Harrison 18/e p3388)

PROPHYLACTIC CRANIOSPINAL IRRADIATION

- Prophylactic craniospinal irradiation is useful in CNS malignancy which disseminate via CSF or any malignancy with high risk of CNS spread^Q.

Indications of Prophylactic Craniospinal Irradiation	
<ul style="list-style-type: none"> Medulloblastoma^Q Glioblastoma^Q Germinoma^Q Small cell Ca of lung^Q 	<ul style="list-style-type: none"> ALL^Q Non hodgkin's lymphoma^Q Leptomeningeal Rhabdomyosarcoma^Q

76. Ans. a. G₂M

77. Ans. a. CNS (Ref: Radiation Oncology 8/e p41; Harrison 19/e p839-840)

AMIFOSTINE

- Amifostine offers no protection to CNS, as it doesn't cross blood brain barrier
- Amifostine is a radiation protector
- Amifostine provide protection against hematologic and non-hematologic toxicity of cisplatin also

Mechanism of action:

- Amifostine scavenges free radicals produced by ionizing radiations

Tissue Protected:

- Gut lining, hematopoietic system and salivary glands

78. Ans. a. Ewing's sarcoma

Most radiosensitive ovarian tumor	• Dysgerminoma ^a
Most radiosensitive brain tumor	• Medulloblastoma ^a
Most radiosensitive testicular tumor	• Seminoma ^a
Most radiosensitive lung tumor	• Small cell CA ^a
Most radiosensitive kidney tumor	• Wilms tumor ^a
Most radiosensitive bone tumor	• Ewing's Sarcoma ^a and Multiple myeloma ^a

79. Ans. c. Cobalt-60 (Ref: Text Book of Radiation Oncology by Leibel Philips 2nd/231)

- Cobalt-60 is a synthetic radioactive isotope of cobalt with a half-life of 5.27 years
- Cobalt-60 is used only in teletherapy

80. Ans. a. X-rays (Ref: Harrison 18/e p691-692)

RADIOTHERAPY

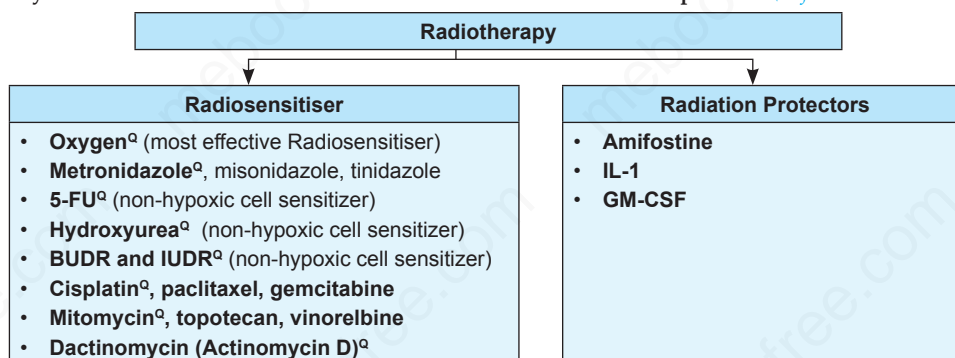
- X-rays and gamma rays are the most common radiations used to treat cancers.
- X-rays are generated by linear accelerators
- Gamma rays are generated from decay of atomic nuclei in radio-isotopes like cobalt.

81. Ans. c. Cells in G₂M phase, d. Dividing cells

82. Ans. b. Cobalt-60

83. Ans. c. 5.26 years

84. Ans. b. Radioprotector (Ref: Radiation Oncology 8/e p41)



- Hypoxic cells are resistant to radiotherapy^a.
- Augmentation of oxygen is the basis of radiosensitization^a.

85. Ans. b. Amifostine

86. Ans. b. Prostate (Ref: Text Book of Radiation Oncology by Leibel Philips 2/e p315, 334)

INTENSITY MODULATED RADIATION THERAPY (IMRT)

- The radiation dose is designed to conform to the three dimensional (3-D) shape of the tumour by modulation or controlling the intensity of the radiation beams to focus a higher radiation dose to the tumour while minimizing radiation exposure to surrounding normal tissues^a.

Indications of IMRT	
<ul style="list-style-type: none"> • Prostate cancer^a • Pancreatic tumors • Head and neck cancers 	<ul style="list-style-type: none"> • Primary and metastatic brain tumors • Liver tumors (HCC and metastasis)

IN RADIOTHERAPY

- Most radiosensitive tissue of body: **Bone marrow**^Q
- Least radiosensitive tissue of body: **Nervous tissue / Brain**^Q
- Most radiosensitive blood cell: **Lymphocyte**^Q (That's why Lymphocytic predominant Hodgkins lymphoma has best prognosis)
- Least radiosensitive blood cell: **Platelet**^Q
- Most common organ to be affected by radiation: **Skin**^Q (Erythema earliest change, layer most commonly affected stratum basalis)
- Sebaceous gland function doesn't recover after radiotherapy.
- **Pinna** and **axillae** are common sites of **radionecrosis** i.e. for skin doses.
- Most **radio resistant** organ: **Vagina**
- Most common **mucosa** to be affected by radiation: **Intestinal mucosa**^Q (Earliest symptom is **diarrhea**)
- Most sensitive abdominal organ: **Kidney**

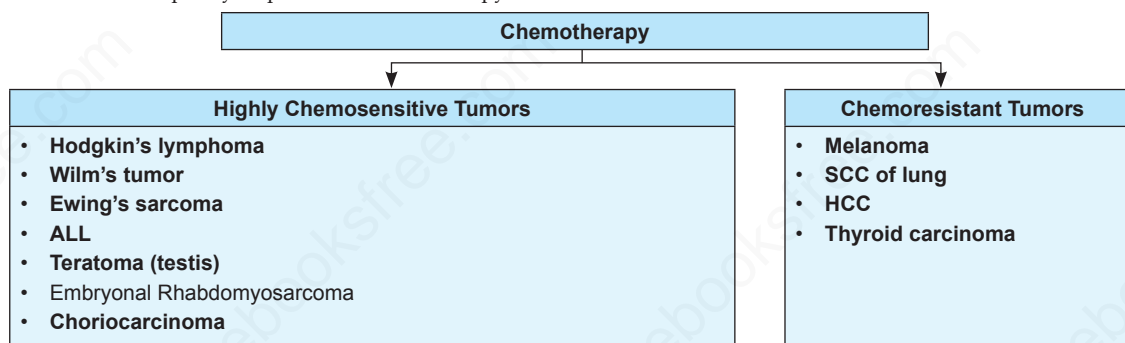
MISCELLANEOUS

87. Ans. a. Wilm's tumor (Ref: CSDT 11/e p1345; CPDT 16/e p807-809)

- 5-year survival in localized Wilm's tumor of favorable histology: >97%

88. Ans. a. CA thyroid (Ref: Harrison 18/e p693)

- Thyroid carcinoma is poorly responsive to chemotherapy.



89. Ans. c. Concurrent chemotherapy (Ref: Bailey 26/e p720, 25/e p748; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p291-292)

CHEMOTHERAPY IN CANCERS OF ORAL CAVITY, HEAD AND NECK

- Adjuvant chemotherapy has been reported to **improve the rate of organ preservation** with **no change in overall survival**^Q.
- Chemotherapy is often **employed in palliative setting** in patients with **recurrent, unresectable** or **distant metastases**^Q.
- **Drugs used:** Cisplatin^Q, Methotrexate, 5-FU, Docetaxel and Paclitaxel
 - Cisplatin is the **cornerstone drug** in the modern management of head and neck cancer^Q.
 - **Most beneficial is concurrent chemotherapy**^Q.
- The addition of **concurrent chemotherapy (cisplatin)** to conventional radiation **significantly improved survival over radiation alone**^Q.
- **Concurrent chemoradiation protocols** have **improved locoregional control** and **reduce the development of distant disease**^Q.

90. Ans. b. Prostate cancer (Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927, 9/e p789; Bailey 25/e p939)

Malignancies associated with Migratory Thrombophlebitis	
<ul style="list-style-type: none"> • CA pancreas (MC)^Q • CA lung^Q • GI malignancies^Q 	<ul style="list-style-type: none"> • Prostate cancer^Q • Ovarian cancer^Q • Lymphoma^Q

- Trousseau's syndrome: Migratory thrombophlebitis^Q
- Trousseau's sign: Carpopedal spasm in hypocalcemia^Q
- Troisier's sign: Palpable left supraclavicular LN (Virchow's node)^Q

91. Ans. b. Tumor let

92. Ans. a. Oropharyngeal carcinoma (Ref: Bailey 26/e p709-710, 25/e p734, 738; Devita 9/e p729)

- MC site of CA oral cavity: Tongue > Lip^Q
- MC histological type of CA oral cavity: Squamous cell carcinoma^Q
- MC type of cancer in India: CA oral cavity^Q
- MC site of CA oral cavity in India: Buccal mucosa^Q (38%) > Anterior tongue (16%) > Lower alveolus (15.7%)
- LN metastasis is most common in: CA tongue^Q > Floor of mouth > Lower alveolus > Buccal mucosa > Upper alveolus > Hard palate > Lip^Q.
- Bilateral lymphatic spread is common in: Lower lip^Q, supraglottis^Q and soft palate^Q.

93. Ans. d. CA oral cavity

94. Ans. d. Liposarcoma

95. Ans. a. Sjögren's syndrome (Ref: Harrison 18/e p406, 419)

PSEUDOLYMPHOMA

- Group of disorders having a **benign course** but exhibiting **clinical and histological features** suggestive of **malignant lymphoma**.
- Characterized by **benign infiltration of lymphoid cells** or **histiocytes** which microscopically resembles a malignant lymphoma.

Pseudolymphoma is seen in	
Autoimmune Disorders	Drug-induced
<ul style="list-style-type: none"> • Sjogren syndrome • Dysgammaglobulinemia 	<ul style="list-style-type: none"> • Phenytoin and phenobarbital • Primidone

96. Ans. a. Apical lobe of lung

97. Ans. a. Lyme's disease (Ref: Harrison 18/e p1402)

Condition	Seen in
Necrolytic erythema migrans	• Glucagonoma
Erythema chronicum migrans	• Lyme's disease
Erythema infectiosum (fifth disease)	• Parvovirus B19
Erythema marginatum	• Acute rheumatic fever

98. Ans. d. Osteosarcoma (Ref: Robbins 8/e p475)

Small Round Blue Cell Tumors (WEL PNR)	
<ul style="list-style-type: none"> • Wilm's tumor • Ewing's sarcoma • Lymphoma • Medulloblastoma • Small cell variant of osteosarcoma 	<ul style="list-style-type: none"> • Primitive neuroectodermal tumor • Neuroblastoma • Rhabdomyosarcoma • Askin tumor • Desmoplastic small cell tumor

99. Ans. a. Medullary carcinoma thyroid (Ref: Sabiston 19/e p705)

Familial Cancer Syndromes			
Syndrome	Genes	Locations	Cancer Sites and Associated Traits
Breast/ovarian syndrome	BRCA1	17q21 ^Q	Cancer of breast, ovary, colon, prostate ^Q
	BRCA2	13q12.3 ^Q	Cancer of breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma ^Q
Cowden's disease	PTEN	10q23.3 ^Q	Cancer of breast, endometrium, thyroid ^Q
FAP	APC	5q21 ^Q	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	hMLH1 ^Q	3p21 ^Q	Colorectal cancer, endometrial cancer, transitional cell carcinoma of ureter and renal pelvis, carcinomas of the stomach, small bowel, pancreas, ovary ^Q
	hMSH2 ^Q	2p22-21	
	hMSH6	2p16 ^Q	
	hPMS1	2q31.1	
	hPMS2	7p22.2 ^Q	
Hereditary papillary RCC	MET ^Q	7q31 ^Q	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	

Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	p53	17p13 ^a	Breast cancer, soft tissue sarcoma, osteosarcoma, brain tumors, adrenocortical carcinoma, Wilms' tumor, phyllodes tumor (breast), pancreatic cancer, leukemia, neuroblastoma ^a
	hCHK2	22q12.1	
MEN-1	MENIN ^a	11q13 ^a	Pancreatic islet cell tumors, parathyroid hyperplasia, pituitary adenomas ^a
MEN-2	RET ^a	10q11.2	Medullary thyroid cancer, pheochromocytoma, parathyroid hyperplasia ^a
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	NF1 ^a	17q11 ^a	Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain tumors ^a
Neurofibromatosis -2	NF2 ^a	22q12 ^a	Acoustic neuromas, meningiomas, gliomas, ependymomas ^a
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	STK11 ^a	19p13.3 ^a	Gastrointestinal carcinomas, breast cancer, testicular cancer, pancreatic cancer, benign pigmentation of skin and mucosa ^a
Retinoblastoma	RB ^a	13q14 ^a	Retinoblastoma, sarcomas, melanoma, malignant neoplasms of the brain and meninges ^a
Tuberous sclerosis	TSC1	9q34	Multiple hamartomas, RCC, astrocytoma
	TSC2	16p13	
von Hippel-Lindau syndrome	VHL ^a	3p25 ^a	RCC, hemangioblastomas of retina and CNS, pheochromocytoma ^a
Wilms' tumor	WT ^a	11p13 ^a	Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation ^a

100. Ans. a. BRCA-1: Lung, c. Chromosome 16: Philadelphia chromosome

101. Ans. a. CA colon (Ref: Harrison 18/e p693)

- Harrison says "Chemotherapy can be administered as an adjuvant (i.e. in addition to surgery or radiation) after all clinical apparent disease has been removed. This use of chemotherapy may have curative potential in breast and colorectal neoplasms, as it attempts to eliminate clinically unapparent tumor that may have already disseminated."

102. Ans. a. Pheochromocytoma, b. Insulinoma, d. Appendicular carcinoid (Ref: Sabiston 19/e p954; Schwartz 10/e 1574,1585-1588, 9/e p1219; Bailey 25/e p816; Blumgart 5/e p940; Shackelford 7/e p1211)

Glucagonoma are mostly malignant and metastatic at the time of presentation.

103. Ans. a. Paget's disease of bone

104. Ans. d. Finger (Ref: Bailey 26/e p600-601, 25/e p618)

GLOMUS TUMOUR

- These arise from subcutaneous arteriovenous shunts (Sucquet-Hoyer canals) especially in the corium of the nail bed.
- Typically, they are small, purple nodules measuring a few millimetres in size, which are disproportionately painful in response to insignificant stimuli (including cold exposure).
- Subungual varieties may be invisible causing paroxysmal digital pain.

105. Ans. c. Chromosome 17

106. Ans. a. Metastatic germ cell tumor (Ref: Harrison 18/e p806, 810; Computed Body Tomography by Lee Sagel 4/e p1207)

The necrotic retroperitoneal mass represents necrotic lymph nodes. Necrotic lymph nodes usually suggest malignant metastasis, most likely due to testicular (germ cell) tumor.

TESTICULAR TUMORS

- Testicular tumors tend to metastasize via the lymphatic system.
- In general, the testicular lymphatics which follow the course of the testicular vessels, drain directly into the lymph nodes in or near the renal hilus.
- After involvement of these sentinel nodes, the lumbar paraaortic nodes become involved (unilaterally or bilaterally), followed by spread to the mediastinal and supraclavicular nodes or hematogenous dissemination to lungs, liver and brain.
- Seminoma is c-kit positive tumor^a

107. Ans. c. Glioma (Ref: KDT 6/e p577)

- Somatostatin is a 'universal switch off'. Somatostatin analogue octreotide decreases secretion of various hormones.

Uses of Octreotide	
<ul style="list-style-type: none"> • Pancreatic neuroendocrine tumors (insulinoma, glucagonoma, VIPoma)^Q • Carcinoid tumors and syndrome^Q 	<ul style="list-style-type: none"> • Acromegaly^Q • Bleeding varices^Q • Enterocutaneous fistula^Q

108. Ans. a. Benign, c. Malformation, d. Mostly Asymptomatic (Ref: Robbins 8/e p262)

HAMARTOMA

- Hamartoma refers to an excessive, focal overgrowth of cells and tissues native to the organ in which it occurs^Q.
- Cellular elements are mature and identical to those found in the remainder of the organ^Q
- Do not reproduce the normal architecture of the surrounding tissue^Q.
- Benign nature^Q
- Mostly asymptomatic, rarely presents with life-threatening clinical problems^Q

HETEROTOPIA (OR CHORISTOMA)

- Choristoma is applied to microscopically normal cells or tissues that are present in abnormal locations^Q.
- Examples: Rest of pancreatic tissue found in the wall of the stomach or small intestine, or a small mass of adrenal cells found in the kidney, lungs, ovaries, or elsewhere^Q.

109. Ans. b. Oral cavity

110. Ans. a. 1975 (Ref: www.nihfw.org/.../NationalHealthProgramme)

NATIONAL CANCER CONTROL PROGRAMME

- To control the problems associated with cancer the Govt. of India has launched a National Cancer Control Programme in 1975 stressing on primary prevention and early detection of cancer^Q.

Males	Female
<ul style="list-style-type: none"> • MC cancer in males (PLC): Prostate > Lung > Colorectal^Q • Cancer deaths in males (LPC): Lung > Prostate > Colorectal^Q 	<ul style="list-style-type: none"> • MC cancer in females (BLC): Breast > Lung > Colorectal^Q • Cancer deaths in females (LBC): Lung > Breast > Colorectal^Q

PREVALENCE OF CANCER

- World wide: 10 million^Q
- India: 2.5 million^Q

111. Ans. d. All of the above

"Acanthosis nigricans can be a reflection of an internal malignancy, most commonly the adenocarcinoma of GIT, lung, uterus and breast."

112. Ans. d. Gallbladder

113. Ans. a. B cell (Ref: <http://www.mdanderson.org/patient-and-cancer-information/cancer-information/cancer-types/eye-cancer/orbit.html>)

ORBITAL LYMPHOMA

- MC type of cancer of the orbit in adults^Q
- Usually a form of B-cell non-Hodgkin's lymphoma^Q.

Clinical Features

- It may show up as a nodule in the eyelid or around the eye, or it may cause the eye to be pushed out^Q.
- This type of eye cancer usually does not cause pain^Q.

Diagnosis

- First step in diagnosis of orbital lymphoma may be a CT scan of the orbit followed by a surgical biopsy^Q.
- Making the correct diagnosis of the biopsy is very important.

Treatment

- Radiation therapy, monoclonal antibody therapy, chemotherapy or a combination of these, depending on type of lymphoma the stage of the tumor.

Sarcoma

MULTIPLE CHOICE QUESTIONS

SOFT TISSUE SARCOMA

1. Most common sarcoma in a child is: (JIPMER 98)

- a. Fibrosarcoma b. Rhabdomyosarcoma
c. Leiomyosarcoma d. Liposarcoma

2. Most common site of lymphangiosarcoma?

- a. Spleen (MHPGMCET 2007, JIPMER 91)
b. Liver
c. Retroperitoneum
d. Post irradiated postmastectomy limb

3. The most common sarcoma in childhood?

- (MHSSMCET 2008)
a. Malignant histiocytoma b. Rhabdomyosarcoma
c. Osteosarcoma d. Liposarcoma

4. With regard to the malignant behavior of leiomyosarcoma, the most important criterion is: (All India 2006)

- a. Blood vessel penetration by tumour cells
b. Tumour cells in lymphatic channels
c. Lymphocyte infiltration
d. The number of mitoses per high power field

5. Synovial sarcoma all are true except: (All India 2010)

- a. Originates in synovium
b. Seen in young age group
c. Occurs at extra-articular sites more often
d. Seen in sites such as knee and foot

6. In which case lymph nodes are resected prophylactically? (AIIMS Nov 98, Feb 97)

- a. Embryonal rhabdomyosarcoma
b. Liposarcoma
c. Fibrosarcoma
d. Neurofibroma

7. All of the following soft tissue sarcoma has propensity for lymphatic spread except: (AIIMS Nov 2005)

- a. Neurofibrosarcoma b. Synovial sarcoma
c. Rhabdomyosarcoma d. Epithelioid sarcoma

8. M.C. retroperitoneal tumour is: (DNB 2011, AIIMS June 98)

- a. Fibrosarcoma b. Liposarcoma
c. Dermoid cyst d. Rhabdomyosarcoma

9. True about soft tissue sarcoma: (PGI Dec 2002)

- a. Lymphatic spread
b. Enlarged size
c. Pseudoencapsulated
d. Spread through musculoaponeurotic plane

10. True statement about soft tissue sarcoma is/are:

(PGI June 2004)

- a. Liposarcoma is MC retroperitoneal sarcoma
b. Incisional biopsy is needed when size >5cm
c. FNAC is diagnostic
d. TNM staging done
e. Radiosensitive

11. Which of the following is best indicator of prognosis of soft tissue sarcoma? (AIIMS Nov 2000, Feb 97, Nov 96, All India 98)

- a. Tumor size b. Histological type
c. Nodal metastasis d. Tumor grade

12. Malignant neoplasm arising from mesenchymal tissue are: (COMEDK 2004)

- a. Carcinoma b. Sarcoma
c. Adenomas d. Teratomas

13. Which of the following sites of soft tissue sarcoma carries the best prognosis?

- a. Head and neck b. Extremity
c. Visceral d. Retroperitoneal

14. Most common site of rhabdomyosarcoma is: (DNB 2011)

- a. Orbit b. Nasopharynx
c. Extremities d. Hypopharynx

15. Most common soft tissue tumour of adults is: (DNB 2010)

- a. Embryonal rhabdomyosarcoma
b. Liposarcoma
c. Synovial sarcoma
d. Malignant fibrous histiocytoma

16. Sarcoma botryoides is also known as:

- a. Embryonal rhabdomyosarcoma (WBPG 2012, DNB 2010)
b. Alveolar rhabdomyosarcoma
c. Leiomyosarcoma
d. Lipoblastomatosis

17. Blood borne spread is a feature of: (DNB 2010)

- a. Carcinoma b. Sarcoma
c. Dysplasia d. Metaplasia

18. Malignant change in lipoma of retroperitoneum may present with: (DNB 2009)

- a. Asymptomatic b. Renal failure
c. Abdominal pain d. All of the above

19. Which of the following immunohistochemical marker can be used for the diagnosis of rhabdomyosarcoma?

(JIPMER 2014, AIIMS May 2013)

- a. Myeloperoxidase b. Desmin
c. Cytokeratin d. Synaptophysin

20. **Commonly done surgery in sarcoma is:** (JIMPER 2012)
- Wide excision
 - Compartmental exsion/exenteration
 - Excision
 - Enucleation
21. **In which of the following malignancies, histological grade is a good prognostic indicator?** (JIMPER 2011)
- Soft tissue sarcoma
 - RCC
 - Malignant melanoma
 - All
22. **Which one of the following statements is true regarding soft tissue sarcoma?** (APPG 2016)
- Most common location is retroperitoneal
 - Fibrosarcoma is the commonest histological variety of soft tissue sarcoma
 - Death is mostly due to lung metastases
 - Account for <1% of pediatric malignancies

KAPOSI SARCOMA

23. **The tissue of origin of Kaposi sarcoma is:** (AIIMS 2005)
- Lymphoid
 - Neural
 - Vascular
 - Muscular
24. **Commonest malignancy in HIV patient:** (AIIMS Nov 99)
- Kaposi sarcoma
 - Adenoma of stomach
 - Astrocytoma
 - CNS lymphoma
25. **All are true regarding Kaposi sarcoma except one** (AIIMS Feb 97)
- Predominant in male
 - Multicentric origin
 - Chemotherapy is treatment of choice
 - Occurs in AIDS patients only
26. **Kaposi's sarcoma:** (SGPGI 2004)
- Does not occur in non HIV positive persons
 - Has increasing incidence among AIDS patients
 - No GI bleeding
 - Uncommon among homosexual HIV positive
27. **Kaposi sarcoma is commonly seen in:** (AMU 95)
- Upper limbs
 - Lower limbs
 - Head and Neck
 - Trunk

EXPLANATIONS

SOFT TISSUE SARCOMA

1. Ans. b. Rhabdomyosarcoma (Ref: Devita 9/e p1780-1784; Sabiston 19/e p1862-1864; Schwartz 10/e 1465,1470, 9/e p1299-1300)

RHABDOMYOSARCOMA

- Rhabdomyosarcoma arises from **mesenchymal tissues**.
- MC sites of origin: **Head and neck^Q (parameningeal^Q) > Extremities > Genitourinary tract > Trunk**
- MC pediatric soft tissue sarcoma: Rhabdomyosarcoma^Q
- Associated with: NF, Beckwith-Weidman syndrome, Li-fraumeni and Fetal alcohol syndrome

Pathology

- MC histological type: Embryonal rhabdomyosarcoma^Q
- Diagnostic cell: Rhabdomyoblast^Q
- May contain **tadpole cells** or **strap cells^Q**
- Embryonal type consist of spindle cell variant and **sarcoma botryoides^Q** (tumor cells resemble **tennis racket^Q** and tumor cells form submucosal zone of hypercellularity known as **cambium layer^Q**)

Clinical Features

- MC presenting symptom: **Mass^Q** (may or may not be painful)
- Bimodal, **first peak** between 2–5 years, **second peak** between 15–19 years
- Extremity RMS are **more common** in lower extremity^Q
- MC site of metastasis: **Lung^Q**

Diagnosis

- Diagnosis is confirmed by **biopsy^Q**
- MRI: IOC for diagnosing extent of disease^Q
- CT: Used to rule out **lung metastasis^Q**

Treatment

- **Wide-local excision^Q** of tumor with surrounding involved tissue
- Tumor **not amenable to primary excision**: **Neoadjuvant chemotherapy**, after the tumor has decreased in size, **resection of gross residual disease**
- Radiation therapy: when **microscopic or gross residual disease** exists after initial treatment.

Prognosis

- Prognosis is related to the **site of origin, resectability, presence of metastases, number of metastatic sites, and histopathologic features^Q**.
- Embryonal variant is a **favorable^Q** and alveolar type has an **unfavorable prognosis^Q**.
- Pleomorphic variant: MC type in adults^Q

Favorable Primary Sites	Unfavorable Primary Sites
<ul style="list-style-type: none"> • Orbit^Q • Nonparameningeal head and neck^Q • Paratestis^Q • Vagina^Q 	<ul style="list-style-type: none"> • Extremity^Q • Parameningeal^Q

2. Ans. d. Post irradiated postmastectomy limb (Ref: Sabiston 19/e p1825; Schwartz 10/e 493, 9/e p1285; Bailey 26/e p601, 25/e p845)

ANGIOSARCOMA (LYMPHANGIOSARCOMA)

- Rare tumor that develops as a **complication** of **long-standing (>10 years) lymphoedema^Q**.
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after radical mastectomy. (Stewart-Treves Syndrome)^Q

Clinical Features

- **Acute worsening of edema^Q**
- Appearance of **sub-cutaneous nodules** with propensity towards **hemorrhage and ulceration^Q**

Treatment

- Pre-operative **chemotherapy** and **radiotherapy** followed by **surgical excision (radical amputation)^Q**
- Associated with **poor prognosis**

3. Ans. b. Rhabdomyosarcoma

4. Ans. d The number of mitoses per high power field (Ref: Devita 9/e p1529-1530)

Grading of leiomyosarcomas is difficult, and mitotic activity appears to be the best indicator of subsequent prognosis when combined with location and size.

LEIOMYOSARCOMA

- Leiomyosarcomas are malignant tumors composed of cells showing **smooth muscle features**.
- **MC site: Uterus^Q**
- **Desmin and actin** are the **MC positive stains^Q**.
- **Grading of leiomyosarcomas is difficult, and mitotic activity^Q appears to be the best indicator of subsequent prognosis when combined with location and size.**
- **Common major vascular sites: Pulmonary artery and IVC^Q**
- **Large tumor size and high mitotic rate/high grade** are factors in **poorer outcome**.
- **Complete excision** remains the **primary therapeutic choice^Q**.

5. Ans. a. Originates in synovium (Ref: Devita 9/e p1545)

Synovial Sarcoma: It generally **does not originate from synovial tissue**, and it has been suggested that the name of this sarcoma subtype should be modified.

SYNOVIAL SARCOMA

- Synovial sarcoma usually occurs in **young adults^Q**.
- **Typically found** in the **para-articular areas** of the **tendon sheaths and joints^Q**.
- At least **50% of cases** are in the **lower limbs^Q** (especially the **knee^Q**), and most of the remainder are seen in the upper limbs.
- It generally **does not originate from synovial tissue^Q**.
- Composed of two morphologically distinct types of cells that form a **characteristic biphasic pattern^Q**.

- **Characteristic chromosomal translocation, t(X;18)(p11.2;q11.2)^Q**
- **These hallmark translocations have become the gold standard in diagnosing synovial sarcoma^Q**
- **100% of biphasic and 96% of monophasic synovial sarcomas possess the specific t(X;18)(p11.2;q11.2) translocation^Q.**

Treatment

- Adequate excision + adjuvant radiotherapy with or without adjuvant chemotherapy^Q.

6. Ans. a. Embryonal rhabdomyosarcoma (Ref: Harrison 18/e p817-820; Schwartz 10/e 1486, 9/e p1288; Sabiston 19/e p772)

- **MC site of metastasis in sarcomas of extremity: Lungs^Q**
- **MC site of metastasis in retroperitoneal sarcomas: Liver^Q**
- **LN metastasis is uncommon in soft tissue sarcoma^Q.**

Sarcomas with Lymph Node Metastasis (MARCES)

- | | |
|---|---|
| <ul style="list-style-type: none"> • Malignant fibrous histiocytoma^Q • Angiosarcoma^Q • Rhabdomyosarcoma^Q | <ul style="list-style-type: none"> • Clear cell sarcoma^Q • Epithelial sarcoma^Q • Synovial sarcoma^Q |
|---|---|

7. Ans. a. Neurofibrosarcoma

8. Ans. b. Liposarcoma (Ref: Devita 10/e p1255, 9/e p1534)

- **MC soft tissue sarcoma in adults: Liposarcoma > Leiomyosarcoma > Malignant fibrous histiocytoma**
- **MC retroperitoneal tumor: Liposarcoma^Q**

9. Ans. b. Enlarged size, c. Pseudoencapsulated, d. Spread though musculoaponeurotic plane (Ref: Devita 10/e p1255, 9/e p1533-1552; Sabiston 19/e p768-780; Schwartz 10/e 666-669, 9/e p1284-1295)

SOFT TISSUE SARCOMA

- Rare unusual neoplasm of soft tissues
- **MC site: Extremity^Q (lower > upper) > Trunk > Retroperitoneum > Head and Neck**
- **MC type: Liposarcoma > Leiomyosarcoma > Synovial sarcoma > Malignant peripheral nerve sheath tumor > Malignant fibrous histiocytoma^Q > GIST**

- MC pediatric soft tissue sarcoma: Rhabdomyosarcoma^Q
- Hematogenous spread is typical of sarcomas^Q

Histopathological Type of STS is Site Dependent	
<ul style="list-style-type: none"> • Extremity • Retroperitoneum • Viscera 	<ul style="list-style-type: none"> • Malignant fibrous histiocytoma^Q > Liposarcoma • Liposarcoma^Q • GIST^Q

Pathology

- STS tends to grow along fascial planes^Q, with the surrounding soft tissue compressed to form a pseudocapsule^Q.
- Clinical behavior of STS is determined by: Anatomic location (depth), grade and size^Q
- MC route of spread in soft tissue sarcoma: Hematogenous^Q
- MC site of metastasis: Lung^Q; Lymphatic metastasis is rare^Q

Clinical Features

- MC symptom of STS: Painless mass^Q
- Size at presentation is dependent on the location of tumor^Q.
 - Smaller tumors are located in distal extremities^Q
 - Larger tumors are detected in proximal extremity and retroperitoneum^Q.
 - Retroperitoneal STS almost always present as large asymptomatic mass^Q

Diagnosis of Soft Tissue Sarcoma

- Core-cut or true-cut biopsy (CT or USG guided) is diagnostic^Q
- Incisional biopsy is done if core-cut biopsy is non-diagnostic^Q
- FNAC: To confirm or rule out presence of metastatic focus or local recurrence^Q
- MRI: IOC for assessing extremity STS^Q
- CECT: IOC for assessing retroperitoneal sarcoma^Q

Treatment

- Adequate excision + adjuvant radiotherapy with or without adjuvant chemotherapy^Q.

Prognosis

- Best prognostic factor of soft tissue sarcoma: Grading^Q
- Best prognosis is seen in: Extremity STS^Q
- MC cause of death in STS: Metastasis^Q; 5-year survival rate for STS (all stages): 50–60%

10. Ans. a. Liposarcoma is MC retroperitoneal sarcoma, b. Incisional biopsy is needed when size > 5 cm, d. TNM staging done

11. Ans. d. Tumor grade

12. Ans. b. Sarcoma

13. Ans. b. Extremity

14. Ans. a. Orbit

15. Ans. b. Liposarcoma

16. Ans. a. Embryonal rhabdomyosarcoma

17. Ans. b. Sarcoma (Ref: Robbins 7/e p720)

Hematogenous spread is typical of sarcomas and lymphatic spread is typical of carcinoma.

18. Ans. d. All of the above (Ref: Robbins 8/e p1318)

RETROPERITONEAL TUMORS

- Deep seated mass in abdomen
- When the tumor is very large do symptoms of pain or functional disturbances occur
- Retroperitoneal tumors may present themselves with signs of weight loss, emaciation and abdominal pain
- These tumors may also compress the kidney or ureter leading to renal failure

19. Ans. b. Desmin (Ref: Devita 9/e p1780-1784; Sabiston 19/e p1862-1864; Schwartz 10/e 666-669, 1465-1487, 9/e p1299-1300)

Desmin can be used for the diagnosis of rhabdomyosarcoma.

20. Ans. a. Wide excision

21. Ans. a. Soft tissue sarcoma

22. Ans. c. Death is mostly due to lung metastases

KAPOSI SARCOMA

23. Ans. c. Vascular (Ref: Harrison 18/e p1564-1565; Devita 9/e p2101-2104; Sabiston 19/e p764; Schwartz 10/e 485, 9/e p418)

KAPOSI'S SARCOMA

- Kaposi's sarcoma appears as **rubbery bluish nodules** that occur **primarily on the extremities**^Q but **may appear anywhere** on the **skin and viscera**^Q.
- Classically, KS is seen in people of **Eastern Europe** or **sub-Saharan Africa**^Q.

AIDS-related Kaposi's Sarcoma

- AIDS-related KS occurs **primarily in male homosexuals** and **not in IV drug abusers or hemophiliacs**^Q
- Lesions **spread rapidly** to the **nodes** and **GI and respiratory tract** often are **involved**^Q.
- Development of AIDS-related KS is **associated with concurrent infection** with a **herpes-like virus (HHV-8)**

Pathology

- Usually **multifocal**^Q rather than metastatic.
- Histologically, the lesions are composed of **capillaries lined by atypical endothelial cells**^Q.
- **Early lesions** may **resemble hemangiomas**, while **older lesions** contain more spindle cells and **resemble sarcomas**.
- Lesions are **locally aggressive** but **undergo periods of remission**^Q.

Treatment

- Treatment for all types of KS consists of **radiation**^Q to the lesions.
- **Combination chemotherapy** is effective in controlling the disease, although most patients develop an opportunistic infection during or shortly after treatment^Q.
- **Surgical treatment** is **reserved for lesions that interfere with vital functions**; such as
 - **Bowel obstruction and Airway compromise**^Q

24. Ans. a. Kaposi sarcoma (Ref: Devita 9/e p2100)

- **Most common malignancy in HIV positive individuals: NHL > Kaposi sarcoma**^Q

25. Ans. d. Occurs in AIDS patients only

26. Ans. b. Has increasing incidence among AIDS patients

27. Ans. b. Lower limbs

DERMATOFIBROSARCOMA PROTUBERANS (DFSP)

- DFSP is a **low-grade sarcoma** because it **may recur locally** but **rarely metastasizes**^Q.
- Monomorphous, mononuclear, **spindle cell lesion involving both dermis and subcutis**^Q.
- **MC site: Trunk**^Q (50%) > **Extremities** (30%) > **Head and neck** (20%)

Pathology

- **Large lesions** often are associated with **satellite nodules**; **Positive for CD34**^Q
- Have **unpredictable radial extensions**^Q of tumor **permeating through the subcutaneous tissue** large distances from the primary nodule.
- **More than 75%** of DFSP have a **ring chromosome**^Q, composed of translocated portions of chromosomes **17 and 22**^Q

Clinical Features

- Typically **presents in early or mid-adult life**, beginning as a **nodular cutaneous mass**^Q.
- **Pattern of growth: Slow and persistent**^Q
- Lesion enlarges over many years, it **becomes protuberant**^Q

Treatment

- **Aggressive resection with special attention to radial margins** (local recurrence rate <5%)
- **Up to 50%** recur after **simple excision**^Q.
- **Imatinib: First line of treatment for advanced disease**^Q.

SECTION 10

OTHERS

CHAPTERS

- ❖ Pediatric Surgery
- ❖ Trauma
- ❖ Transplantation
- ❖ Anesthesia and Perioperative Complications
- ❖ Robotics, Laparoscopy and Bariatric Surgery
- ❖ Sutures and Anastomoses
- ❖ Sterilization and Infection
- ❖ Fluid, Electrolyte and Nutrition
- ❖ Blood Transfusion
- ❖ Shock
- ❖ Miscellaneous

Pediatric Surgery

MULTIPLE CHOICE QUESTIONS

1. A six years old female presents with constipation and urinary retention. On examination on a presacral mass is noted. Most probable diagnosis is: (AIIMS May 2008)
 - a. Pelvic neuroblastoma
 - b. Rectal duplication cyst
 - c. Sacrococcygeal teratoma
 - d. Anterior sacral meningocele
2. First meconium is said to be formed during the month of fetal life: (PGI 81, AIIMS 84)
 - a. Second
 - b. Fourth
 - c. Seventh
 - d. Ninth
3. Sacrococcygeal teratoma is embryological remnant of? (MHSSMCET 2007)
 - a. Neural tube
 - b. Allantois
 - c. Notochord
 - d. Primitive streak
4. A one month old female child has swelling over the back in the sacral region. There is no cough impulse in the swelling. X-ray examination shows erosion of the coccyx. The most likely clinical diagnosis would be: (UPSC 95)
 - a. Meningocele
 - b. Lipoma
 - c. Sacrococcygeal teratoma
 - d. Neurofibroma
5. Most common solid malignant tumor of infancy:
 - a. Neuroblastoma
 - b. Nephroblastoma
 - c. Germ cell tumor
 - d. Rhabdomyosarcoma
6. Most common posterior mediastinal mass in children is:
 - a. Hodgkin's disease
 - b. Neuroblastoma
 - c. Esophageal duplication cyst
 - d. Bronchogenic cyst
7. Malignant tumor of childhood that metastasizes to bone most often is:
 - a. Neuroblastoma
 - b. Nephroblastoma
 - c. Adrenal gland tumors
 - d. Ovarian granulose cell tumor
8. Which of the following is the most common tumor of newborn? (All India 2012)
 - a. Neuroblastoma
 - b. Wilm's tumors
 - c. Leukemia
 - d. Sacrococcygeal teratoma
9. Primitive streaks remnants give rise to: (DNB 2012)
 - a. Neuroblastoma
 - b. Wilm's tumour
 - c. Sacrococcygeal teratoma
 - d. Hepatoblastoma

EXPLANATIONS

1. Ans. d. Anterior sacral meningocele (Ref: Sabiston 19/e p1911; Schwartz 10/e p1750, 9/e p1553)

ANTERIOR SACRAL MENINGOCELE

- Defect of anterior aspect of sacrum^Q involving one or more segments with herniation of meningeal sac into extra-peritoneal region.
- More common in females^Q

Clinical Features

- Symptoms usually occur in 2nd to 3rd decade^Q
- Symptoms are primarily owing to the mechanical effects^Q of a pelvic tumor.
- Abdominal pain, constipation, urinary retention^Q or incontinence

Diagnosis

- X-ray: Unilateral sickle shaped distortion of sacral bone (Scimitar sacrum^Q) is pathognomonic. This sign is not present in all cases.

2. Ans. a. Second (Ref: Bailey 25/e p85)

By end of 3 months upper small intestine has become filled with meconium. So the answer should be less than 3 months.

MECONIUM

- Meconium is a sterile mixture of epithelial cells, mucin and bile, formed as the fetus starts to swallow amniotic fluid.
- By end of 3 months upper small intestine has become filled with meconium^Q.

3. Ans. d. Primitive streak (Sabiston 19/e p1865-1866; Schwartz 10/e p1641, 9/e p1450)

SACROCCYGEAL TERATOMA

- Teratomas occur most frequently in the neonatal period, and the sacrococcygeal region is the MC site^Q.
- More common in females^Q

- Thought to be a derivative of the primitive streak^Q
- Most often an obvious external presacral mass^Q

- Most of the tumor is usually external, with a minimal intrapelvic presacral component^Q
- These lesions should be carefully followed with serial USG until delivery because the blood supply to the tumor may grow to the point of stealing a significant proportion of placental blood flow to the fetus^Q.
- The development of hydrops or placentomegaly is associated with a poor prognosis^Q.

- Most neonatal SCTs are benign^Q.
- Incidence of malignancy is related to age at time of diagnosis and is most frequently represented as yolk sac tumors or embryonal carcinomas^Q.

Treatment:

- Complete surgical excision^Q through a chevron-shaped buttock incision.
- Resection of the coccyx is critical^Q because failure to remove this structure results in significantly higher local recurrence rates.

4. Ans. c. Sacrococcygeal teratoma

5. Ans. a. Neuroblastoma (Ref: Sabiston 19/e p1859-1861; Schwartz 10/e p678,1639-1640, 9/e p1449; Bailey 25/e p88-89)

- Neuroblastoma is the MC extracranial solid tumor in childhood
- Neuroblastoma is the 2nd MC solid malignancy of childhood after brain tumors.
- MC solid tumor in childhood: Brain tumors^Q
- MC intra abdominal solid tumor in childhood: Neuroblastoma^Q
- MC malignant tumor of childhood that metastasizes to bone: Neuroblastoma^Q
- MC site of metastasis in neuroblastoma: Long bones^Q

6. Ans. b. Neuroblastoma (Ref: Schwartz 10/e p678, 9/e p570)

Most common posterior mediastinal mass in children is neurogenic tumor (Neuroblastoma among the given options).

Mediastinal Tumors in Children		
Tumor Type	Percentage of Total	Location
Neurogenic tumors	40 ^Q	Posterior ^Q
Lymphomas	18 ^Q	Anterior/middle
Cysts	18	All
Germ cell tumors	11	Anterior
Mesenchymal tumors	9	All
Thymomas	Rare	Anterior

7. Ans. a. Neuroblastoma

8. Ans. d. Sacrococcygeal teratoma (Ref: Surgery of Childhood Tumors (Springer) 2008/49)

- Sacrococcygeal teratoma is the **predominant teratoma** as well as the **most common neoplasm** in the **fetus** and **newborn**^Q with an estimated incidence of 1:20,000 to 1:40,000 live births and a **female predominance**^Q ranging from 2:1 to 4:1.

9. Ans. c. Sacrococcygeal teratoma

MULTIPLE CHOICE QUESTIONS

TRAUMA

- First step in trauma:** (NEET 2013)
 - Blood transfusion
 - IV fluids
 - Reconstruction
 - Maintenance of airways
- A patient travelling with high speed met an road traffic accident. His clinical presentation includes BP 80/40 mm Hg, bleeding from nose, suspected femoral fracture, cyanosed body, difficulty in respiration and decreased respiratory sound on right side. Initial management preference will be given to:** (PGI Nov 2011)
 - Haemostatic anterior and posterior nasal packing
 - Thoracostomy tube insertion
 - ETT in line with cervical canal
 - I.V Fluid immediate
 - Chest X-ray
- Which of the following occurs in acute trauma?** (JIPMER 2011)
 - Increase in insulin
 - Decrease in glucagon
 - Decrease in cortisol
 - Increase in thyroxine
- In surgical stress all hormone is increased except:**
 - ADH
 - ACTH (PGI June 2009)
 - Cortisol
 - Insulin
 - Renin
- In surgical stress all hormones are increased except:**
 - Adrenaline
 - ACTH (PGI Nov 2011)
 - Epinephrine
 - Cortisol
 - Insulin
- Early stage of trauma is characterized by:** (All India 2003)
 - Catabolism
 - Anabolism
 - Glycogenesis
 - Lipogenesis
- In case of clearing airway one of the following is not included:** (AIIMS June 95)
 - Neck tilt
 - Mouth gag
 - Chin lift
 - Head lift
- First step taken in case of multiple injuries of face and neck:** (UPSC 2008, AIIMS June 95)
 - Blood transfusion
 - IV fluids
 - Reconstruction
 - Maintenance of airways
- In severe injury, first to be maintained is:** (NEET 2013, PGI June 97)
 - Hypotension
 - Dehydration
 - Airway
 - Cardiac status
- Which one of the following veins should be avoided for intravenous infusion in the management of abdominal trauma?**
 - Cubital
 - Cephalic (UPSC 2001)
 - Long saphenous
 - External jugular
- Following trauma, which hormone is not released?**
 - Thyroxine
 - Glucagon (All India 92)
 - ADH
 - GH
- Protein metabolism after trauma is characterized by all of the following except** (UPSC 2007)
 - Increased liver gluconeogenesis
 - Inhibition of skeletal muscle breakdown by IL-1 and TNF
 - Increased urinary nitrogen loss
 - Hepatic synthesis of acute phase reactants
- A female with suspected child abuse was brought to the casualty with severe bleeding from perineum. What should be the first line of management?** (AIIMS November 2014)
 - Airway maintenance
 - Internal iliac artery ligation
 - Whole blood transfusion
 - Inform police before starting the treatment
- The first priority in management of a case of head injury with open fracture of shaft of femur is:** (AIIMS May 2014)
 - Neurosurgery consultation
 - Give IV fluids
 - Intubation
 - Splintage of fracture
- Back examination of poly-trauma patient is known as:** (Recent Question 2015)
 - Log roll
 - Barrel role
 - Chin lift
 - None

TRAUMA SCORING SYSTEM

- Which one of the following is not a part of the Revised Trauma Score?** (UPSC 2001)
 - Glasgow coma scale
 - Systolic blood pressure
 - Pulse rate
 - Respiratory rate
- Trauma and injury severity score (TRISS) includes:** (All India 2010)
 - GCS + BP + RR
 - RTS + ISS + age
 - RTS + ISS + GCS
 - RTS + GCS + BP

18. **Mangled Extremity Severity Score (MESS) includes all of the following except?** (AIIMS May 2011)
- Shock
 - Ischemia
 - Neurogenic injury
 - Energy of injury

TRIAGE

19. **In triage green color indicates:** (COMEDK 2005)
- Ambulatory patients
 - Dead or moribund
 - High priority treatment or transfer
 - Medium priority or transfer
20. **Triage system is used for:** (Recent Question 2015)
- Burn
 - Earthquake
 - Polytrauma
 - Floods
21. **Which colour of triage is given the highest priority?**
- Red
 - Green (AIIMS Nov 2013)
 - Yellow
 - Black

BLUNT TRAUMA ABDOMEN

22. **Most common organ involved in blunt injury to the abdomen:** (WB PG 2015, JIPMER 2011, 2014, PGI Dec 99, MCI March 2005)
- Spleen
 - Liver
 - Intestines
 - Kidney
23. **Investigation of choice for blunt trauma abdomen in unstable patient:** (PGI Dec 2000)
- X-ray abdomen
 - USG
 - Diagnostic Peritoneal lavage (DPL)
 - MRI
 - CT scan
24. **Investigation of choice for diagnosing intra abdominal bleeding in an unstable patient:** (PGI Dec 2001)
- CT scan
 - MRI scan
 - USG
 - Diagnostic peritoneal lavage
25. **Babu is brought to the emergency as a case of road traffic accident. He is hypotensive. Most likely ruptured organ is:**
- Spleen
 - Mesentery (All India 2001)
 - Kidney
 - Rectum
26. **Commonly injured in blunt abdominal injury is/are:** (PGI June 2001)
- Mid ileum
 - Proximal jejunum
 - Mid jejunum
 - Distal ileum
 - Ileocecal junction
27. **A driver wearing seat belt applied brake suddenly to avoid accident. Most common organ injured in seat belt injury:** (AIIMS May 2013)
- Liver
 - Spleen
 - Mesentery
 - Abdominal aorta
28. **Preferred incision for abdominal exploration in blunt injury abdomen is:** (All India 2007)
- Always midline incision
 - Depending upon the organ
 - Transverse incision
 - Paramedian

29. **A case of blunt trauma is brought to the emergency, in a state of shock; he is not responding to IV crystalloids; next step in his management would be:** (All India 2001)
- Immediate laparotomy
 - Blood transfusion
 - Albumin transfusion
 - Abdominal compression
30. **A patient developed hemoperitoneum following RTA, with BP 90/60 and pulse 140/min, which of the following to be done?** (PGI Dec 2003)
- DPL to be done
 - Liver is the MC organ to rupture
 - USG is better than CT scan
 - X-ray to be taken in supine position
 - Urgent surgery to be done
31. **A male patient with blunt trauma abdomen is hemodynamically stable. What is the next line of management?** (All India 2008)
- Observation
 - Further imaging of abdomen
 - Exploratory laparotomy
 - Laparoscopy
32. **Best diagnostic test in stable patient with blunt trauma abdomen is:** (Recent Question 2014, DNB 2012)
- CECT scan
 - MRI
 - DPL
 - FAST
33. **Blunt injuries to the abdomen:** (JIPMER 82, 80)
- May cause peritonitis
 - Rarely need urgent laparotomy
 - May cause intestinal obstruction
 - May cause gastroduodenal ulceration
34. **Which of the following is not true?** (DPG 2007)
- Spleen is most commonly injured in the blunt trauma
 - Small intestine is most commonly injured in penetrating trauma
 - Thoracic duct injury needs urgent thoracotomy
 - Conservative treatment is preferred for solid organ injury
35. **FAST stands for:** (AP PG 2015, AIIMS Nov 2013)
- Focused assessment with sonography for trauma
 - Focused abdominal sonography for trauma
 - Fast assessment with sonography for trauma
 - Fast assignment with sonography and tomography (computed)
36. **Which of the following is not assessed in FAST?** (Recent Question 2015)
- Right upper quadrant
 - Left upper quadrant
 - Hypogastrium
 - Sub-xiphoid area
37. **A man with blunt injury abdomen after road side accident has a blood pressure of 100/80 mm Hg and a pulse rate of 120/min. Airway has been established and respiration has been stabilized. Next best step in management is:** (All India 2009)
- Immediate blood transfusion
 - Blood for cross matching and IV fluids
 - Ventilate the patient
 - Rush the patient to the OT
38. **A patient is brought to the emergency as a case of head injury, following a head on collision road traffic accident. His BP is 90/60 mmHg. Tachycardia is present. Most likely diagnosis is:** (All India 2001)
- EDH
 - SDH
 - Intracranial hemorrhage
 - Intra-abdominal bleed

39. A 40 years old male drive had a car accident in which he got wedged in-between. He complained of severe abdominal pain with radiation to the back. The initial CT on admission was negative except for minimal retroperitoneal hematoma. The diagnosis is: (ComedK 2010)
- Liver injury
 - Duodenal perforation
 - Bowel rupture
 - Pancreatic injury
40. True about indication of celiotomy in blunt trauma: (PGI June 2009)
- Peritoneal air on imaging
 - Severe hypotension
 - Grade I spleen damage
 - Grade II liver damage
 - Patient with positive diagnostic peritoneal lavage
41. A patient with abdominal injury presents to the emergency department with signs of signs of peritonitis and shock. Airway and breathing were secured and IV fluids were started with 2 large bore cannulas. The next line of management should be: (All India 2011)
- FAST
 - Exploratory laparotomy under general anesthesia
 - Insertion of abdominal drain followed by laparotomy
 - Laparoscopy
42. The four points of probe placement in Focused Abdominal Sonogram for trauma (FAST) in blunt thoraco-abdominal trauma are: (Karnataka 2004)
- Epigastrium, (R) hypochondrium, (L) Lower chest, hypogastrum
 - Epigastrium, (R) and (L) Hypochondria, (R) Iliac fossa
 - Epigastrium, (R) and (L) Lumbar regions, hypogastrum
 - Hypogastrum, (R) and (L) Lumbar regions, (R) lower chest
43. All the following are True regarding fast-except: (APPG 2015)
- It is a focused abdominal sonar for trauma
 - It is accurate in detecting < 50 ml of free blood
 - It cannot reliably exclude injury in penetrating trauma
 - It detects free fluid in the abdomen or pericardium

DAMAGE CONTROL SURGERY

44. Damage control surgery is: (JIMPER 2014, AIIMS May 2013)
- Minimal intervention done to stabilize the patient and do the definitive surgery later
 - Maximum possible surgical intervention is done immediately
 - Done during triage procedure
 - Done to control damage during surgery
45. Aim of damage control laparotomy are: (PGI June 2009)
- Provide fascial closure
 - Arrest hemorrhage
 - Control contamination
 - Prevent infection
 - Prevent coagulopathy
46. Aims of abbreviated laparotomy: (PGI June 2005)
- Decreased change of infection
 - Early ambulation
 - Early wound healing
 - Hemostasis
47. Abbreviated laparotomy done for: (PGI Dec 2007)
- Coagulopathy
 - Hypotension
 - Early wound healing
 - Early ambulation
 - Hemostasis

ABDOMINAL COMPARTMENT SYNDROME

48. True about abdominal compartment syndrome: (PGI June 2009, Dec 2008)
- ↓ Cardiac output
 - ↓ Urine output
 - ↓ Pulmonary capillary wedge pressure
 - ↓ Venous return
 - ↓ Systemic vascular resistance
49. True about abdominal compartment syndrome include the following except: (MHSSMCET 2008)
- >15 cm of H₂O
 - Decreased pulmonary venous pressure
 - IAP Measured using Foley's catheterization of bladder
 - With >25-30 mm Hg IAP, life threatening hypoxia and ARDS can occur
50. Abdominal compartment syndrome is characterized by the following except: (UPSC 2007)
- Hypercarbia and respiratory acidosis
 - Hypoxia due to increased peak inspiratory pressure
 - Hypotension due to decrease in venous return
 - Oliguria due to ureter obstruction
51. Increased intra abdominal pressure is/are associated with: (PGI June 2004)
- ↑ Pulmonary capillary wedge pressure
 - ↑ Venous return
 - ↑ Pulmonary inspiratory pressure
 - ↑ Renal blood flow
 - ↑ Cardiac output
52. True about abdominal compartment syndrome: (PGI Dec 2008)
- ↓ Cardiac output
 - ↓ Urine output
 - ↓ Venous return
 - ↓ Systemic vascular resistance
53. Which one of the following statements is true regarding Abdominal Compartment Syndrome? (APPG 2016)
- Reduction in visceral perfusion and increase in intracranial pressure
 - diagnosis can be reliably made by physical examination
 - The intraabdominal pressure in grade I ACS is 21-35 cm H₂O
 - Definitive surgery is immediately done followed by closure of abdomen.

PENETRATING INJURIES

54. Organ most commonly damaged in penetrating injury of abdomen is: (WBPG 2014, AIIMS Nov 94, Nov 95)
- Liver
 - Small intestine
 - Large intestine
 - Duodenum
55. Treatment of choice for stab injury caecum: (All India 89)
- Cecostomy
 - Ileo-transverse anastomosis
 - Transverse colostomy
 - Sigmoid colostomy
56. Which of the following is used to define penetrating neck injury? (AIIMS May 2009, All India 2008)
- 2 cm depth of wound
 - Injury to vital structures
 - Breach of platysma
 - Through and through wound

57. The probable cause of sudden death in a case superficial injury to neck is: (DNB 2005)

- Injury to phrenic nerve
- Air embolism through external jugular vein
- Bleeding from subclavian artery
- Injury to trachea

58. A man comes to emergency with stab injury to left flank. He has stable vitals. What would be the next step in management: (AIIMS Nov 2008)

- CECT
- Diagnostic peritoneal lavage
- Laparotomy
- Laparoscopy

59. A patient with stab injury to anterior abdomen presents with a tag of omentum protruding through the abdominal wall near the umbilicus. On evaluation he is hemodynamically stable and shows no signs of peritonitis. Initial management of patient should involve: (All India 2011)

- FAST
- Exploratory Laparotomy
- Local Wound Exploration and Suturing
- CECT Abdomen

60. Which of the following is not done in case of puncture wound of left colon? (Recent Question 2015)

- Primary suture
- Hemicolectomy
- Externalization
- Resection and anastomosis

BLAST INJURIES

61. In a blast injury, which of the following organ is least vulnerable to the blast wave? (AIIMS June 2003)

- G.I tract
- Lungs
- Liver
- Ear drum

62. Most common organ injured in underwater explosion: (MHSSMCET 2009)

- TM
- GIT
- Lungs
- Heart

HEPATIC INJURIES

63. A 17-years old boy is admitted to the hospital after a road traffic accident. Per abdomen examination is normal. After adequate resuscitation, his pulse rate is 80/min and BP is 110/70 mmHg. Abdominal CT reveals 1 cm deep laceration in the left lobe of the liver extending from the dome more than half way through the parenchyma. Appropriate management at this time would be: (DPG 2011, UPSC 2005)

- Conservative treatment
- Abdominal exploration and packing of hepatic wounds
- Abdominal exploration and ligation of left hepatic artery
- Left hepatectomy

SPLenic INJURIES

64. A 30-years old gentleman after sustaining road traffic accident present in emergency with BP 100/60 mmHg, Pulse 120 min

and CT scan shows splenic laceration at inferior border after 2 units of blood transfusion, patients conditions are: BP 120/70 mmHg and pulse 84/min; the next line of management is: (PGI June 2003)

- Laparotomy
- Splenorrhaphy
- Continue the conservative treatment and take subsequent measures on monitoring the patient
- Splenectomy
- X-ray abdomen and aspiration

65. A child presents in causality in stable condition after a blunt abdominal trauma associated with splenic trauma. Treatment of choice is: (AIIMS Nov 2000)

- Observation
- Splenectomy
- Arterial embolisation
- Splenorrhaphy

66. True about blunt abdominal trauma with splenic rupture: (PGI June 2008)

- Kehr's sign-discoloration around umbilicus
- Spleen is most common organ to be involved
- Splenectomy is treatment of choice for splenic rupture
- Cullen's sign seen

67. A 30-years old person met with a roadside accident. On admission his pulse rate was 120/minute, BP was 100/60 mmHg. USG examination revealed laceration of the lower pole of spleen and hemoperitoneum. He was resuscitated with blood and fluid. Two hours later, his pulse was 84/minute and BP was 120/70 mm Hg. The most appropriate course of management in this case would be: (DPG 2011)

- Exploring the patient followed by splenectomy
- Exploring the patient followed by excision of the lower pole of spleen
- Splenorrhaphy
- Continuation of conservative treatment under close monitoring system and subsequent surgery if further indicated

68. About trauma spleen false is: (DPG 2006)

- Partial splenectomy cannot be done
- Post splenectomy infection common
- Can cause late onset shock
- Mostly managed conservatively

69. Trauma to spleen in a stable patient is best diagnosed by: (MCI Sept 2005, March 2008)

- X-ray abdomen
- USG
- CT scan
- Diagnostic peritoneal lavage

70. In a RTA patient sustained trauma to left side of chest and abdomen. Fluid in the peritoneum and sign of hypotension was found on physical examination. Most probable diagnosis is? (DNB 2014)

- Splenic injury
- Diaphragmatic injury
- Rib fracture
- Renal injury

71. A 27 years old patient presented with left sided abdominal pain 6 hours after RTA. He was hemodynamically stable and FAST positive. CT scan showed grade III splenic injury. What will be appropriate treatment? (Recent Question 2015)

- Splenectomy
- Splenorrhaphy
- Splenic artery embolization
- Conservative management

STOMACH, DUODENUM AND PANCREATIC INJURIES

72. Which of the following statements related to gastric injury is not true? (All India 2007)
- Mostly related to penetrating trauma
 - Treatment is simple debridement and suturing
 - Blood in stomach is always related to gastric injury
 - Heals well and fast
73. A young patient presents with a massive injury to proximal duodenum, head of pancreas and distal common bile duct. The procedure of choice in this patient should be: (All India 2008)
- Roux-en-Y anastomosis
 - Pancreaticoduodenectomy (Whipple's operation)
 - Lateral tube jejunostomy
 - Retrograde jejunostomy

CHEST TRAUMA

74. A patient died after a blunt trauma to chest. Most common cause of death in blunt trauma to chest is:
- Esophageal rupture
 - Tracheo-bronchial rupture
 - Pulmonary laceration
 - Pneumothorax
75. Commonest cause of death in penetrating injury of chest: (AIIMS Sept 96, June 2000)
- Tracheobronchial injury
 - Esophageal rupture
 - Pulmonary laceration
 - Chylothorax
76. A 40-years old man brought to the emergency room with a stab injury to the chest. On examination patient is found to be hemodynamically stable. The neck veins are engorged and the heart sounds are muffled. The following statements are true for this patient except: (AIIMS Nov 2002)
- Cardiac tamponade is likely to be present
 - Immediate emergency room thoracotomy should be done
 - Echocardiogram should be done to confirm pericardial blood
 - The entry wound should be sealed with an occlusive dressing
77. Following a major trauma a patient presented 54 hours later with raised JVP and CVP of 16 mm of Hg and persistent hypotension. Most probable diagnosis is: (PGI Dec 2000, Dec 2003)
- Tension pneumothorax
 - Cardiac tamponade
 - Head injury
 - Splenic trauma
 - Air embolism
78. Sitaram a 40-years old man, met with an accident and comes to emergency department with engorged neck veins, pallor, rapid pulse and chest pain. Diagnosis is: (AIIMS June 99)
- Pulmonary laceration
 - Cardiac tamponade
 - Hemothorax
 - Splenic rupture
79. A patient is brought to casualty with severe hypotension following a road traffic accident. No external injury is evident. The cause of hypotension is: (AIIMS June 2001)
- Fracture rib
 - Intrathoracic and abdominal bleed
 - Iatrogenic shock
 - Intracranial bleed
80. Which of the following is most common cause of hypotension in fracture ribs (T10 -T12)? (AIIMS Nov 99, June 99)
- Abdominal solid visceral organ injury
 - Injury to aorta

- Inter costal artery damage
- Pulmonary contusion

81. Treatment of acutely developing massive left sided hemothorax in a young male after an accident is: (AIIMS Nov 93)

- Strapping of chest
- Tube thoracostomy
- Endotracheal intubation + IPPV + pleural fluid aspiration
- Conservative, wait and watch

82. Treatment of rib fracture: (PGI Dec 2002)

- Immediate thoracotomy
- IPPV
- Strapping
- ICWS

83. Treatment of simple rib fracture include all of the following except: (Recent Question 2015)

- Analgesic
- Physiotherapy
- Strapping
- Early ambulation

84. In case of blunt injury thorax, most common complication is: (AIIMS June 95)

- Pneumothorax
- Rib fracture
- Hemopneumothorax
- Aortic rupture

85. Best approach in thoracic trauma is: (Recent Questions 2013)

- Midline sternotomy
- Parasternal thoracotomy
- Anterolateral thoracotomy
- Posterolateral thoracotomy

FLAIL CHEST

86. True about flail chest: (PGI June 2004)

- Fracture of 3 or 4 ribs
- Chest wall moves inwards during inspiration
- Mechanical Ventilation always needed
- Mediastinal shift
- Ultimately leads to respiratory failure

87. What is the treatment of choice in severe flail chest?

- IPPV
- Strapping
- Wiring
- Nasal Oxygen

88. The immediate treatment of choice in most cases of flail chest is: (PGI 81, AMC 86)

- Analgesics
- Positive pressure ventilation
- Tracheostomy
- Breathing exercises

89. Steering wheel injury on chest of a young man reveals multiple fractures of ribs and paradoxical movement with severe respiratory distress. X-ray shows pulmonary contusion on right side without pneumothorax. What is the initial treatment of choice? (UPSC 2007)

- Immediate internal fixation
- Endotracheal intubation and mechanical ventilation
- Thoracic epidural analgesia and O₂ therapy
- Stabilization with towel clips

90. Management of flail chest with respiratory failure is:

- Chest tube drainage
- Oxygen administration
- IPPV
- Internal operative fixation of the fractures segments

91. True about flail chest are all except: (MCI March 2007)

- Ultimately leads to respiratory failure
- Paradoxical respiration
- Fracture of 3-4 ribs
- Mediastinal shift

92. Simple rib fracture should be treated with all except:

(Recent Question 2014, MHPGMCET 2007)

- a. Analgesics
- b. Physiotherapy
- c. Early ambulation
- d. Strapping of chest

93. A man presented with fractures of 4th to 10th ribs and respiratory distress after RTA. He is diagnosed to have flail chest and a PaO₂ of <60%. Management is: (AIIMS June 2001)

- a. Tracheostomy
- b. IPPV with oral intubation
- c. Fixation of ribs
- d. Strapping of chest

94. A man is brought to casualty who met with RTA. He sustained multiple rib fractures with paradoxical movement of chest. Management is: (PGI June 2006)

- a. Tracheostomy
- b. Consult cardiothoracic surgeon
- c. Strapping
- d. Intermittent positive pressure ventilation
- e. No intervention required

95. Treatment of choice of flail chest is: (Recent Questions 2013)

- a. External fixation of flail segment and mechanical ventilation
- b. Strapping
- c. O₂ administration
- d. Intrapleural local analgesia

96. All are true about flail chest, except: (Recent Question 2015)

- a. Fracture of at least 3 ribs
- b. If overlapping of fractured ribs with severe displacement is seen then patients are treated surgically with open reduction and fixation
- c. PaO₂<40 with FiO₂>60 treated with intubation and PEEP
- d. Paradoxical movement may not be seen in conscious patients

DIAPHRAGMATIC INJURY

97. Traumatic diaphragmatic injury except: (PGI Nov 2009)

- a. Left side rupture due to weak left hemidiaphragm at point of entry of embryonic origin
- b. Most commonly due to trauma
- c. Smaller tears heal spontaneously and surgery is not required
- d. Abdominal approach is the most favored
- e. Mask ventilation is encouraged in patient with massive visceral herniation

98. True about diaphragmatic injury: (PGI Dec 2008)

- a. Advise diagnostic laparoscopy
- b. Chest X-ray is useful
- c. Conservative management is done in most cases
- d. Late complication is herniation of abdominal content
- e. All penetrating diaphragmatic injury must be repaired via chest

99. About diaphragmatic injury, true statement is:

(AIIMS June 98)

- a. Treatment is conservative
- b. Resolves spontaneously
- c. Left side is more common
- d. Associated with pneumothorax

100. Diagnosis of traumatic rupture of diaphragm: (PGI June 2007)

- a. Laparoscopy
- b. Chest X ray
- c. Diagnostic peritoneal lavage
- d. CT

HEAD INJURY

101. Prognosis in head injury is best given by:

(All India 2007, AIIMS Nov 2006)

- a. Glasgow coma scale
- b. Age of patient
- c. Mode of injury
- d. CT head

102. Base of the skull fracture presents with involvement of the petrous temporal bone, which of the following important sign is seen? (UPPG 2007)

- a. Subconjunctival hematoma
- b. CSF rhinorrhoea
- c. Raccoon eyes
- d. Battle sign

103. A 20-years old male come to casualty with head injury. Examination reveals normal consciousness and blood in the tympanic membrane. Most likely cause is: (UPPG 2008)

- a. Extradural hemorrhage
- b. Subdural hemorrhage
- c. Intraventricular hemorrhage
- d. Basilar fracture

104. The earliest manifestation of increased intracranial pressure following head injury is: (All India 2005)

- a. Ipsilateral papillary dilatation
- b. Contralateral papillary dilation
- c. Altered mental status
- d. Hemiparesis

105. The term post traumatic epilepsy refers to seizures occurring:

(AIIMS Nov 2002)

- a. Within moment of head injury
- b. Within 7 days of head injury
- c. Within several weeks to months after head injury
- d. Many years after head injury

106. After 4 weeks of head trauma, patient presents with features of irritability and altered sensorium. Commonest cause will be: (AIIMS Nov 2000)

- a. Chronic subdural hematoma
- b. Extradural hematoma
- c. Intraparenchymal bleed
- d. Electrolyte imbalance

107. After head injury, biconvex, lenticular shape hematoma in CT scan is characteristic of which of the following: (AIIMS June 99)

- a. Extradural hemorrhage
- b. Subdural hemorrhage
- c. Intracerebral hematoma
- d. Diffuse-axonal injury

108. Which of the following is commonest source of extradural hemorrhage? (AIIMS Nov 98, Feb 97, All India 96)

- a. Middle meningeal artery
- b. Subdural venous sinus
- c. Charcot's artery
- d. Middle cerebral artery

109. CSF otorrhea is caused by:

(AIIMS Nov 98)

- a. Fracture of cribriform plate
- b. Fracture of parietal bone
- c. Fracture of petrous temporal bone
- d. Fracture of tympanic membrane

110. Management for CSF rhinorrhoea is:

(AIIMS Feb 97)

- a. Plain X-ray and packing of nose
- b. Nasal packing only
- c. Antibiotics and observation
- d. Immediate surgery

111. After rupture of middle meningeal artery bleeding occurs in which region? (AIIMS Feb 97)

- Subdural bleed
- Extradural bleed
- Intracerebral bleed
- Subarachnoid bleed

112. A patient with sudden headache, vomiting and unconsciousness, diagnosis is: (PGI June 2001)

- Subarachnoid hemorrhage
- Intracerebral hemorrhage
- Subdural hemorrhage
- Extradural hemorrhage

113. Hemostasis in scalp wound is best achieved by:

- Direct pressure over the wound (AIIMS 79, PGI 85)
- Catching and crushing the bleeders by haemostats
- Eversion of galea aponeurotica
- Coagulation of bleeders

VASCULAR INJURIES

114. In traumatic transaction of the femoral artery and vein, which among the following should be done? (PGI Dec 2001)

- Femoral artery repair with vein ligation
- Repair of artery and vein
- Ligation of femoral artery
- Below knee amputation
- Repair of artery with contralateral sympathectomy

115. A person following a road-traffic accident presented in emergency with laceration of inguinal region. On examination, there was swelling of inguinal region and distal pulsation was felt; internal iliac artery was normal, common iliac and external femoral artery was normal but common femoral vein is transected. Treatment of choice is:

(PGI June 2003)

- Vein repair with continuity
- Sclerotherapy
- Ligation of femoral artery and vein
- Amputation below knee

116. In traumatic injury to common femoral vein and external femoral artery, which among the following should be done?

(PGI Dec 2003)

- Ligation of both artery and vein
- Repair of artery and vein
- Below knee amputation
- Repair of artery and contralateral sympathectomy
- Sclerotherapy

117. True about aortic transaction:

(PGI June 2008)

- Most commonly due to deceleration injury
- High mortality
- Surgery definitive treatment
- Aortography gold standard

118. Which of the following causes maximum bleeding? (PGI 95)

- Partial arterial severing
- Complete arterial severing
- Artery caught between fractured end of bones
- Intimal tear

SEAT BELT INJURY

119. Which of the following statement(s) is/are true about trauma injury? (PGI June 2009)

- Seat belt can cause pancreato-duodenal injury
- Late death is caused by sepsis

c. Damage Control Surgery (DCS) is used to control major bleeding and to prevent contamination of peritoneal cavity.

d. In DCS the abdomen is closed in layer to prevent evisceration

e. In DCS, laparotomy is decided based on patient prognosis

120. Seat belt causes injury to: (MAHE 2004)

- Duodenum
- Head injury due to wind screen
- Thorax
- All

MISCELLANEOUS

121. A patient presents in emergency with a cervical spine fracture. First thing to do is: (AIIMS Nov 99, June 99)

- Locate the fracture by shifting the patient side to side
- X-ray of spine
- Clear the airway and intubate him
- Immobilize the cervical spine

122. What will be the appropriate management of a patient with a clean wound over forearm with slight loss of tissue? He has received, tetanus toxoid 12 years back: (AIIMS June 99)

- Complete course of TT
- Only one dose of TT
- Full dose of Human tetanus Ig
- No treatment needed

123. Limb salvage can be done in all except: (AIIMS Feb 97)

- Nerve injury
- Vascular injury
- Bone injury
- Muscle injury

124. A patient after sustaining RTA, developed fracture left shaft of femur with guarding and rigidity in the abdomen. Following is to be done: (PGI Dec 2003)

- X-ray of left lower limb and USG abdomen
- Start IVF, Ryle's tube and catheterization
- Stabilize the fracture and monitor the patient and do surgery if necessary later on
- Grouping and cross matching of two unit of blood
- Stabilize the fracture only

125. Which one of the following is not a principle followed in the management of missile injuries? (UPSC 2004)

- Excision of all dead muscles
- Removal of foreign bodies
- Removal of fragments of bone
- Leaving the wound open

126. When bullet is shot above pubic symphysis in midline directed backwards, first organ to get injuries is? (DPG 2008)

- Bladder
- Abdominal aorta
- Left renal vein
- Spleen

127. In resection of muscle with history of trauma/crush injury, resection depends on: (PGI Dec 2006)

- Contractility of muscle
- Color of muscle
- Bleeding punctuate spots
- Size of muscle
- Function of muscle

128. During reconstruction of an amputated limb which of the following is done first? (AIIMS Nov 2010)

- Arterial repair
- Venous repair
- Fixation of the bone
- Nerve anastomoses

129. Which of the following structures is fixed first during reimplantation of an amputated digit?

- a. Bone
- b. Artery
- c. Vein
- d. Nerve

130. Hypotension in acute spinal injury is due to:

(AIIMS Nov 2006)

- a. Loss of sympathetic tone
- b. Loss of parasympathetic tone
- c. Orthostatic hypotension
- d. Vasovagal attack

131. Due to decelerations, aorta can be ruptured at places where it is fixed except:

(AIIMS May 2012)

- a. At ligamentum arteriosum
- b. Behind the esophagus

- c. Behind the crura of diaphragm
- d. Aortic valve

132. Criteria for brainstem death includes:

(All India 2012)

- a. Positive Doll's eye reflex
- b. Absent pupillary light reflex and dilated pupils
- c. Pinpoint pupils
- d. Positive vestibulo-ocular reflex

133. During resuscitation, artefacts of fractured ribs most commonly involve:

(AIIMS May 2014)

- a. 2nd – 4th ribs
- b. 3rd – 5th ribs
- c. 4th – 6th ribs
- d. 5th – 7th ribs

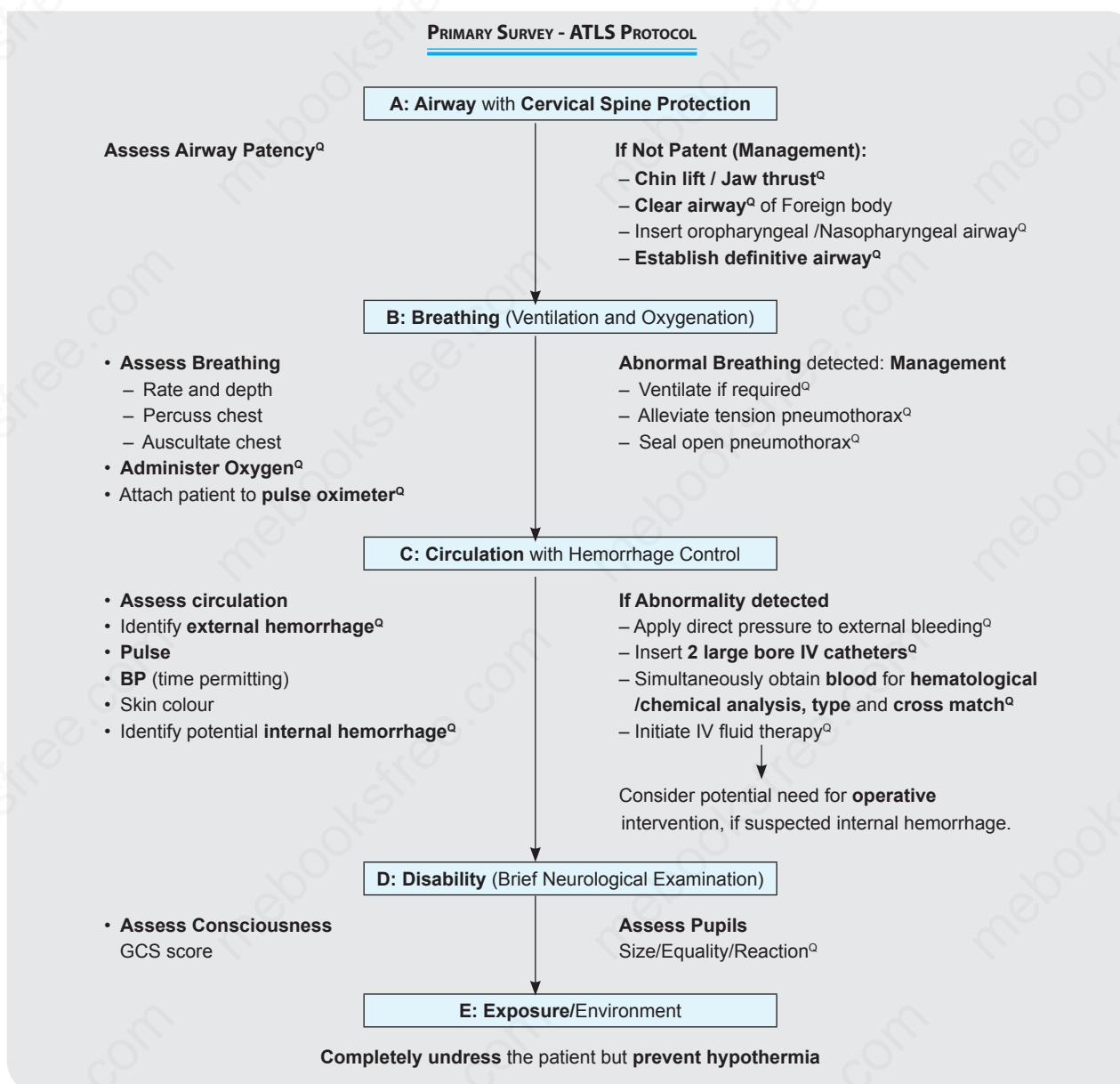
EXPLANATIONS

TRAUMA

1. Ans. d. Maintenance of airways
2. Ans. a. Hemostatic anterior and posterior nasal packing, b. Thoracosotomy tube insertion, c. ETT in line with cervical canal, d. I.V Fluid immediate (Ref: *Advanced Trauma Life Support (ATLS) Manual 7/e p33-34; CSDT 11/e p205*)

The patient in question needs to be managed in accordance with the Advanced Trauma Life Support (ATLS) protocol.

Always assume all major trauma patients have an injured spine and maintain spinal immobilisation until spine is cleared. Priorities in management are ABCDE.



Secondary Survey

1. **Head & face:** Skull fracture & laceration
2. **Neck**
3. **Chest:** Rib fracture
4. **Abdomen:** Rule out abdominal pain, tenderness, bruising; NG tube insertion is contraindicated in presence of facial fracture (orogastric tube should be inserted), urinary catheter should be inserted if no blood is present at meatus
5. **Back:** Log Roll – 5 people are required for examination of back, 3 for body, one for head and one for examining back at this time
6. **Extremities:** Each limb should be examined for tenderness, crepitation or abnormal movement.
7. **Neurological examination:**
 - Repeat GCS, re-evaluate the pupils
 - Look for any localising/lateralising signs
 - Look for signs of cord injury

- Anterior and posterior nasal packing should be done to control nose bleeding^Q.
- Resuscitation of patient in hypovolemic shock begins with making sure that airway is secure by ensuring that ventilation and oxygenation are adequate, and in the case of hemorrhagic shock, by controlling bleeding^Q.
- External bleeding is controlled by application of pressure over the bleeding areas, surgical control or in a rare case, by tourniquet^Q.
- Immediately life-threatening pulmonary injuries that must be detected and treated (by chest tube or thoracotomy) include presence of tension pneumothorax, open pneumothorax, flail chest and massive hemothorax^Q.
- Large bore needle or IV cannula should be in place while a chest tube is inserted for definitiveness^Q.
- The chest X-ray is of utmost importance in thoracic trauma however, the aforementioned life-threatening injuries preclude the necessity of chest X-ray for diagnosis and should be identified clinically^Q.

3. Ans. d. Increase in thyroxine (Ref: Bailey 25/e p4-9; CSDT 11/e p103-105)

CSDT says "Following injury, neural impulses carried via spinothalamic pathways activate the brain stem and thalamic and cortical centers, which stimulate the hypothalamus. Hypothalamic stimulation triggers combined neural and endocrine discharges. Norepinephrine^Q is released sympathetic nerve endings, epinephrine^Q from the adrenal medulla^Q, aldosterone from the adrenal cortex, ADH^Q from the adrenal cortex, ADH from the posterior pituitary, glucagon^Q from the pancreas, and ACTH^Q, TSH^Q, and growth hormone^Q from the anterior pituitary. These hormones produce secondary elevations of cortisol^Q, thyroid hormone^Q, and somatomedins."

HORMONES INCREASED IN RESPONSE TO SURGICAL STRESS

- Catecholamines^Q: The plasma catecholamines increase immediately after trauma and achieve peak concentration in 24-48 hours depending on the severity.
- Glucagon^Q: Glucagon along with catecholamine and cortisol promotes and prolongs the liver glycogenesis.
- Cortisol^Q: Hypothalamus during stress secretes ACTH^Q, which in turn initiates sudden increase in cortisol level^Q.
- Growth Hormone^Q: The secretion of GH is governed by hypothalamic factors, autonomic stimulation and non-hormonal signals. The primary metabolic action of GH during stress is to promote protein synthesis and enhance lipid break down, and glucose stores.
- Vasopressin (ADH)^Q
- Aldosterone^Q
- Renin-Angiotensin^Q
 - The plasma concentration of insulin during stress has been noted to be biphasic, characterized by the suppression of insulin secretion followed by a normal secretion^Q.

4. Ans. d. Insulin

5. Ans. e. Insulin

6. Ans. a. Catabolism (Ref: CSDT 11/e p100)

METABOLIC AND NEUROENDOCRINE RESPONSE TO TRAUMA OR SURGERY

- Injury Phase (Phase of catabolism):
 - Begins at the time of injury and lasts for 2-5 days^Q
 - Phase of hypermetabolism^Q
 - Stress hormones (cortisol, catecholamines and glucagon^Q) and volume control hormones (renin-angiotensin, aldosterone and ADH^Q) are increased. This leads to proteolysis, lipolysis, hyperglycemia and wound healing despite of negative nitrogen balance.
- Turning Point:
 - Transient period marked physiologically by turning off of the neuroendocrine response and clinically by the appearance of getting well.

23. Ans. b. USG

24. Ans. c. USG (Ref: Sabiston 19/e p455; Schwartz 10/e p173-174, 9/e p155; Bailey 25/e p275, 287, 1184)

- Blunt trauma patient with hemodynamic instability should be evaluated by USG (FAST) in the resuscitation room, if available^Q.
- Hemodynamically stable patients sustaining blunt trauma are adequately evaluated by CECT^Q (after USG).

25. Ans. a. Spleen

26. Ans. b. Proximal jejunum, e. Ileocecal junction (Ref: Sabiston 19/e p463-464)

MECHANISM OF INJURY OF SMALL INTESTINE BY BLUNT TRAUMA

- Crushing of bowel between vertebral bodies and blunt object such as steering wheel or handle bar
- Deceleration shearing of the small bowel at points where it is fixed such as ligament of Treitz (duodenojejunal junction), the ileocecal junction and around the mesenteric artery^Q.
- Closed loop rupture caused by sudden increase in intra-abdominal pressure.

27. Ans. c. Mesentery (Bailey 25/e p1003-1004)

Most common organ injured in seat belt injury is Mesentery.

SEAT BELT INJURY

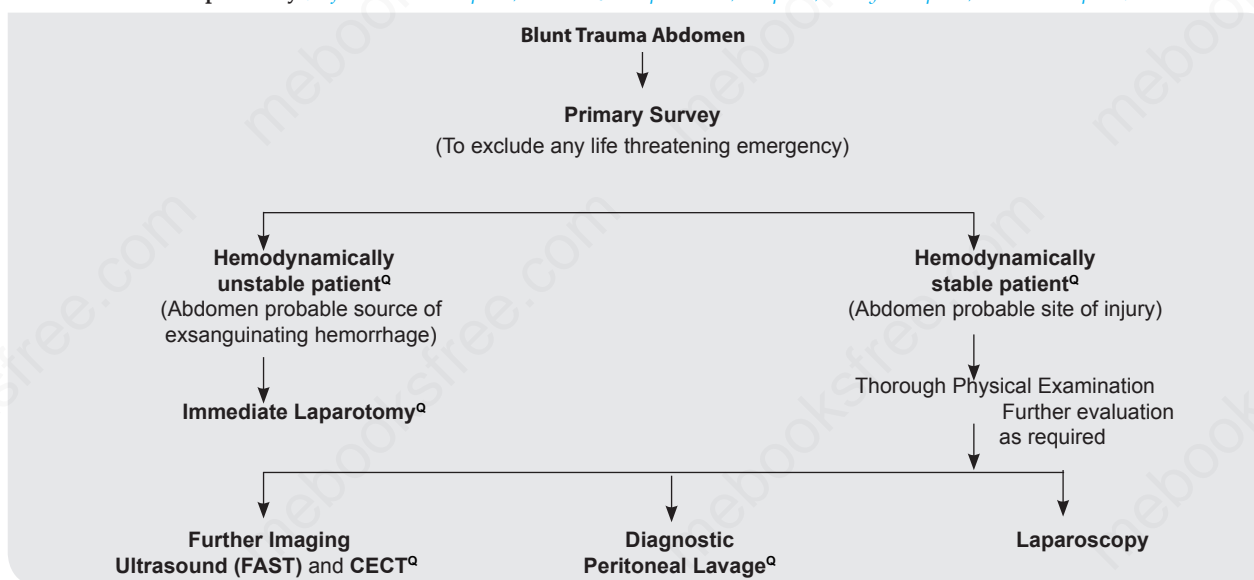
- If a car accident occurs when a seatbelt is worn, sudden deceleration can result in a torn mesentery^Q.
- Blunt trauma to the abdomen by seatbelt injury may compress the pancreas over the vertebral column and result in pancreaticoduodenal injury^Q
- If there is any bruising of the abdominal wall, or even marks of clothing impressed into the skin, laparotomy may be indicated^Q.

28. Ans. a. Always midline incision (Ref: Sabiston 19/e p455; Schwartz 9/e p155; Bailey 25/e p275, 287, 1184)

BLUNT TRAUMA ABDOMEN

- Preferred incision for emergency abdominal exploration is a long midline incision^Q.
- Bailey says "The routine approach for abdominal trauma is full midline Laparotomy"
- Schwartz says "All emergency abdominal explorations are performed using a long midline incision because of its versatility."^Q

29. Ans. a. Immediate laparotomy (Ref: Sabiston 19/e p456; Schwartz 10/e p173-174, 9/e p155; Bailey 25/e p275; CSDT 12/e p228)



30. Ans. c. USG is better than CT scan, e. Urgent surgery to be done

31. Ans. b. Further imaging of abdomen (Ref: CSDT 12/e p228)

A hemodynamically stable patient after blunt trauma abdomen should need further evaluation by imaging. Imaging of the abdomen with Ultrasound (FAST) is the best next line of investigation.

32. Ans. a. CECT Scan

33. Ans. b. Rarely need urgent laparotomy

34. Ans. c. Thoracic duct injury needs urgent thoracotomy (Ref: Bailey 25/e p731)

35. Ans. a. Focused assessment with sonography for trauma (Ref: Sabiston 19/e p437)

FAST stands for Focused assessment with sonography for trauma.

FAST (FOCUSED ASSESSMENT WITH SONOGRAPHY FOR TRAUMA)

- FAST is a **rapid diagnostic examination** to assess patients with **potential thoracoabdominal injuries**^Q.
- FAST is performed **within 2-4 minutes**^Q.
- FAST **sequentially surveys** for the presence or absence of blood in the **pericardial sac**, the right upper quadrant (RU^Q), left upper quadrant (LU^Q), and **pelvis**^Q.

• 4 'Ps' are evaluated in sequence: Pericardial sac → Perihepatic region → Perisplenic region → Pelvis^Q

"Stratosphere sign is a clinical medical ultrasound finding usually in an eFAST examination that can prove presence of pneumothorax."

TWO IMPORTANT X-RAYS IN TRAUMA PATIENTS

- Chest X-ray^Q
- X-ray pelvis^Q with bilateral hip joint

36. Ans. c. Hypogastrium

37. Ans. b. Blood for cross matching and IV fluids (Ref: Advanced Trauma Life Support (ATLS) Manual 7/e p33,34)

The patient in question needs to be managed in accordance with the Advanced Trauma Life Support (ATLS) protocol.

The **airway** (A) has been **secured** and the respiration / **breathing** (B) have already been **stabilized**. **Circulation** (C) needs to be established next. This is achieved by **external control of hemorrhage** (no external hemorrhage is present in this patient) and by restoring circulating volume (TV fluids).

Intravenous access for **fluid resuscitation** should be begun next with **two 16 gauge peripheral catheters**. Blood should be drawn simultaneously and sent for typing and cross matching, at the same time.

38. Ans. d. Intra-abdominal bleed (Ref: CSDT 11/e p252)

- CSDT says "Patients with blunt trauma and hypovolemia should be examined first for intra-abdominal bleeding even if there is no overt existence of abdominal trauma."^Q

39. Ans. d. Pancreatic injury (Ref: Sabiston 19/e p462)

This is a typical case of **pancreatic injury** with **minimal retroperitoneal hematoma** and characteristic presentation of **pain radiating to back**.

40. Ans. a. Peritoneal air on imaging, b. Severe hypotension, e. Patient with positive diagnostic peritoneal lavage (Ref: Sabiston 19/e p 455-456; Schwartz 10/e p173-174, 9/e p155; Bailey 26/e p359, 25/e p275, 287, 1184)

INDICATIONS OF URGENT LAPAROTOMY IN BLUNT TRAUMA ABDOMEN

- Peritonitis^Q
- Free air seen on radiographic examination^Q
- Unexplained hypovolemia^Q
- Positive DPL^Q
- Presence of other injuries known to be frequently associated with intra-abdominal injuries

DIAGNOSTIC PERITONEAL LAVAGE (DPL)

- DPL has **historically** been the **cornerstone diagnostic study** used to detect significant **intra-peritoneal injury** requiring **surgical intervention**, replaced by FAST^Q.
- This quick, simple procedure can be easily performed in the resuscitation area of the emergency department.
- DPL is performed through an **infraumbilical incision** unless the patient has a pelvic fracture or is pregnant.
 - The linea alba is sharply incised, and the **catheter** is directed **into the pelvis**^Q.
 - The abdominal contents should initially be aspirated using a 10-mL syringe.

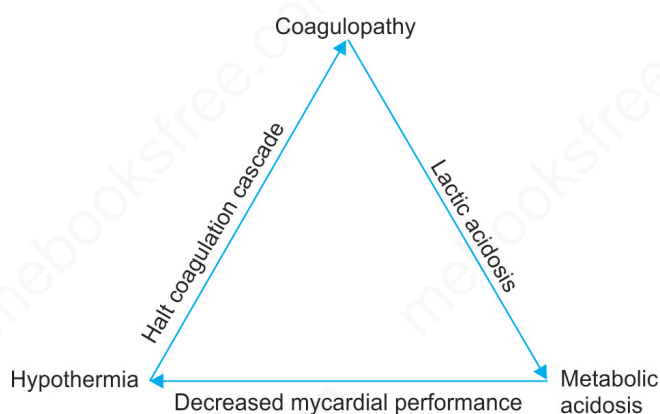
Positive DPL

- **More than 10 ml of gross blood** is **aspirated** directly from the peritoneal cavity^Q
- **Returned effluent contains:**
 - >100,000/mm³ of RBCs^Q
 - >500/mm³ of WBCs^Q
 - Demonstrable **bacteria** or **bile**^Q
- **Sensitivity of DPL** for detecting significant intra-abdominal injury has been reported to range from **82% to 96%**, whereas its **specificity** ranges from **87% to 99%**.

41. Ans. b. Exploratory laparotomy under general anesthesia
42. Ans. c. {Epigastrium, (R) and (L) Lumbar regions, hypogastrium} (Ref: Sabiston 19/e p437)
43. Ans. b. It is accurate in detecting < 50 ml. of free blood

DAMAGE CONTROL SURGERY

44. Ans. a. Minimal intervention done to stabilize the patient and do the definitive surgery later (Ref: Sabiston 19/e p438; Schwartz 10/e p192-195, 9/e p166-167; Bailey 26/e p362-363)



DAMAGE CONTROL SURGERY (DCS)

- DCS centers on coordinating **staged operative interventions** with periods of **aggressive resuscitation** to salvage trauma patients sustaining major injuries^Q.
- Damage control includes an abbreviated laparotomy, temporary packing, and closure of the abdomen in an effort to **blunt the physiological response to prolonged shock and massive hemorrhage**^Q.
 - These patients are often **at limits of their physiological reserve** when they present to operating room and **persistent operative efforts result in exacerbation of their underlying hypothermia, coagulopathy and acidosis**, initiating a vicious cycle that culminates in death^Q.
- In these situations, **abrupt termination of the procedure after control of surgical hemorrhage and contamination**, followed by ICU resuscitation and staged reconstruction, can be life saving^Q.

Phases of Damage Control Surgery

Phase I (Initial Exploration)	Phase II (Secondary Resuscitation)	Phase III (Definitive Operation)
<ul style="list-style-type: none"> • This phase consists of an initial operative exploration to attain rapid control of active hemorrhage and contamination^Q • The abdomen is entered via a midline incision and if exsanguinating hemorrhage is encountered four quadrant packing^Q should be performed • Any violations of GI tract should be treated with suture closure or segmental stapled resection^Q • External drains are placed to control any major pancreatic or biliary injuries 	<ul style="list-style-type: none"> • Following completion of the initial exploration, the critically ill patient is transferred to the ICU^Q. • Invasive monitoring and complete ventilator support^Q are often needed. • This phase focuses on secondary resuscitation to correct hypothermia, coagulopathy and acidosis^Q 	<ul style="list-style-type: none"> • It consists of planned re-exploration and definitive repair^Q of injuries • This phase typically occurs 48 to 72 hours following initial and after successful secondary resuscitation^Q • The abdomen should be closed primarily if possible • Risky GI anastomoses or complex reconstruction should be avoided^Q

45. Ans. b. Arrest hemorrhage, c. Control contamination, d. Prevent infection, e. Prevent coagulopathy (Ref: Sabiston 19/e p438; Schwartz 10/e p192-195, 9/e p166-167)
46. Ans. d. Hemostasis
47. Ans. a. Coagulopathy, e. Hemostasis

ABDOMINAL COMPARTMENT SYNDROME

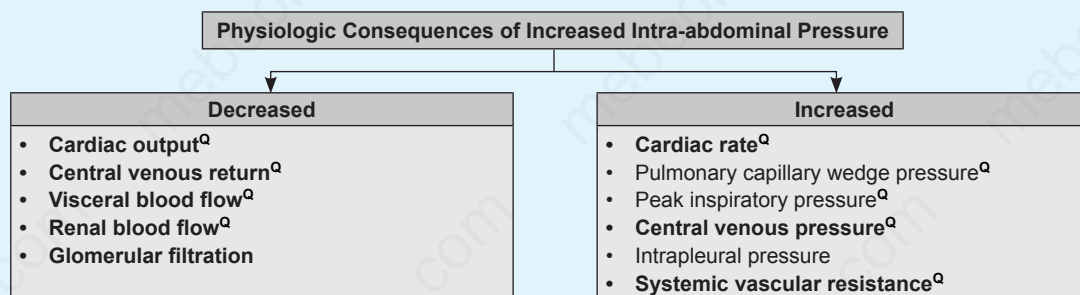
48. Ans. a. ↓Cardiac output, b. ↓Urine output, d. ↓Venous return (Ref: Sabiston 19/e p471-473; Schwartz 10/e p217-218, 9/e p188-189)

ABDOMINAL COMPARTMENT SYNDROME

- ACS is defined as increased intra-abdominal pressure (IAP >20 mm Hg) resulting in compression of abdominal structures^Q, producing fatal complications due to pulmonary failure and mesenteric vascular compromise.
- Normal IAP= 5-7 mmHg; Intra-abdominal hypertension IAP ≥ 12 mmHg

- ACS occurs predominantly in:
 - Patients in profound shock^Q
 - Patients requiring large amounts of resuscitation fluids and blood^Q
 - Those with major visceral or vascular abdominal injuries^Q

- ACS is characterized by a sudden increase in intra-abdominal pressure, increased peak inspiratory pressure, decreased urinary output, hypoxia, hypercapnia, and hypotension secondary to decreased venous return to the heart^Q.



Diagnosis

- Diagnosis is confirmed by measuring bladder pressure, which ultimately represents intra-abdominal pressure.
- A urinary bladder catheter is the gold standard indirect method used to measure IAP.

Abdominal Compartment Syndrome Grading System			
Grade	Bladder Pressure (mm Hg)	Clinical Features	Treatment
I	12–15	None	Normovolemic resuscitation
II	16–20	Oliguria ^Q , splanchnic hypoperfusion	Hypovolemic resuscitation
III	21–25	Anuria, increased ventilation pressure	Decompression
IV	>25	Anuria, increased ventilation pressure and decreased PO ₂ ^Q	Emergency re-exploration

Treatment

- Treatment includes rapid decompression of the elevated intra-abdominal pressure by opening the abdominal wound and performing a temporary closure of the abdominal wall with mesh or a plastic bag (Bogota bag)^Q.

49. Ans. b. Decreased pulmonary venous pressure
50. Ans. d. Oliguria due to ureter obstruction
51. Ans. a. ↑Pulmonary capillary wedge pressure, c. ↑ Pulmonary inspiratory pressure
52. Ans. a. ↓ Cardiac output, b. ↓ Urine output, c. ↓ Venous return
53. Ans. a.Reduction in visceral perfusion and increase in intracranial pressure

PENETRATING INJURIES

54. Ans. b. Small intestine
55. Ans. b. Ileo-transverse anastomosis (Ref: Sabiston 19/e p465)

- Sabiston says "Stab and low-velocity wounds to the colon with minimal contamination and hemodynamic stability can be managed by primary repair."^Q

56. Ans. c. Breach of platysma (Ref: Sabiston 19/e p445-446; Schwartz 10/e p197-200, 9/e p148-150)

NECK INJURIES

- Most severe neck injuries are caused by penetrating wounds and may present an immediate threat to life as a result of airway compromise or hemorrhage^Q.
 - The major vascular and aerodigestive structures in the neck are located in the anterior triangle, and all are deep to the platysma^Q.
 - Platysma and SCM are useful anatomic boundaries^Q.
- Injuries that do not penetrate the platysma can be considered superficial, and no further investigation is needed. Wounds that penetrate the platysma must be further evaluated.
- Injuries that are anterior to SCM present a high likelihood of significant injury, whereas those that track posterior to SCM are unlikely to involve major vascular or aerodigestive structures.
- Penetrating injuries to the posterior triangle should raise concern about trauma to the cervical spine and spinal cord^Q.

Neck is divided into Three Horizontal Zones on craniocaudal location

Zone I	<ul style="list-style-type: none"> At thoracic inlet^Q Extends from sternal notch to cricoid cartilage^Q Injuries in this zone carry the highest mortality because of the presence of great vessels^Q and difficult surgical approach.
Zone II	<ul style="list-style-type: none"> Midportion of the neck^Q Extends from cricoid cartilage to angle of mandible^Q
Zone III	<ul style="list-style-type: none"> Extends from angle of mandible to base of skull^Q

57. Ans. b. Air embolism through external jugular vein (Ref: Bailey 25/e p75,76,1381,1382)

When neck or chest veins are injured, air may enter the veins and causes immediate death due to air embolism.

58. Ans. a. CECT (Ref: Sabiston 19/e p456; Washington Manual of Surgery 5th/373)

According to EAST Guidelines "Current recommendations for nonoperative management of penetrating trauma include use of Triple Contrast CT (IV, oral and rectal) and serial examinations."

PENETRATING ABDOMINAL INJURIES

- Gunshot Abdominal Wounds:
 - Chances of internal injury is very high in gunshot wounds, thus little pre-operative evaluation is required and laparotomy is mandatory^Q.
- Stab Wounds to Abdomen:
 - Exploratory laparotomy is indicated in patients with isolated penetrating abdominal wound if hypotensive or in shock or showing peritoneal signs^Q.

Anterior Stab Wounds	Flank and Back Wounds
<ul style="list-style-type: none"> Local wound exploration can be performed to determine if there is any penetration of the peritoneal cavity^Q. If the tract terminates without entering the peritoneum, the injury can be managed as a deep laceration^Q and laparotomy is not needed. Otherwise, penetration of the peritoneum is assumed and significant injury must be excluded by further diagnostic evaluations^Q (FAST, CECT, DPL or laparoscopy) 	<ul style="list-style-type: none"> Risk of injury to colon, kidney and ureter^Q Triple contrast CT^Q is advised to detect colon and retroperitoneal injuries and the need for laparotomy.

59. Ans. d. CECT Abdomen (Ref: Practice Management Guidelines for Selective Non-operative Management of Penetrating Abdominal Trauma (Journal of Trauma; Vol 68, No. 3, March 2010)

"Omental protrusion in a hemodynamically stable patients without signs of peritoneal irritation is not an absolute indication for exploratory laparotomy"- Injury: volume 18; Issue 2; 87-88

- Routine laparotomy is not indicated in hemodynamically stable patients with abdominal stab wounds without signs of peritonitis or diffuse abdominal tenderness (away from the wound site).^Q
- Such patients can be initially managed non-operatively, but an abdominopelvic CT scan should be strongly considered as a diagnostic tool to facilitate initial management decisions.^Q

60. Ans. b. Hemicolectomy

BLAST INJURIES

61. Ans. c. Liver (Ref: Sabiston 19/e p612-613; Bailey 26/e p430, 25/e p422-423)

BLAST INJURIES

- **Primary blast injuries** result from the rapid overpressure or shock waves produced by an explosion
- These injuries result from the **dramatic changes in barometric pressure** projected from the point of detonation
- Primary blast injuries predominantly cause **damage to air filled hollow organs** of the body from **rapid pressure change (barotraumas)**.

- Damage to air filled organs includes **middle ear, lungs and GIT**.^Q

- Most sensitive and most frequently injured hollow organ: Tympanic membrane^Q > Lungs
- Blast damage to the lungs is the MC cause of life threatening injury^Q following an explosion.

Most Severely Affected Organs	Most Commonly Affected Organs
<ul style="list-style-type: none"> • Air Blast: Lungs^Q • Underwater: GIT^Q 	<ul style="list-style-type: none"> • Air: Tympanic membrane^Q • Underwater (Fully submerged): TM^Q • Underwater (Head is out): GIT^Q

62. Ans. a. TM

HEPATIC INJURIES

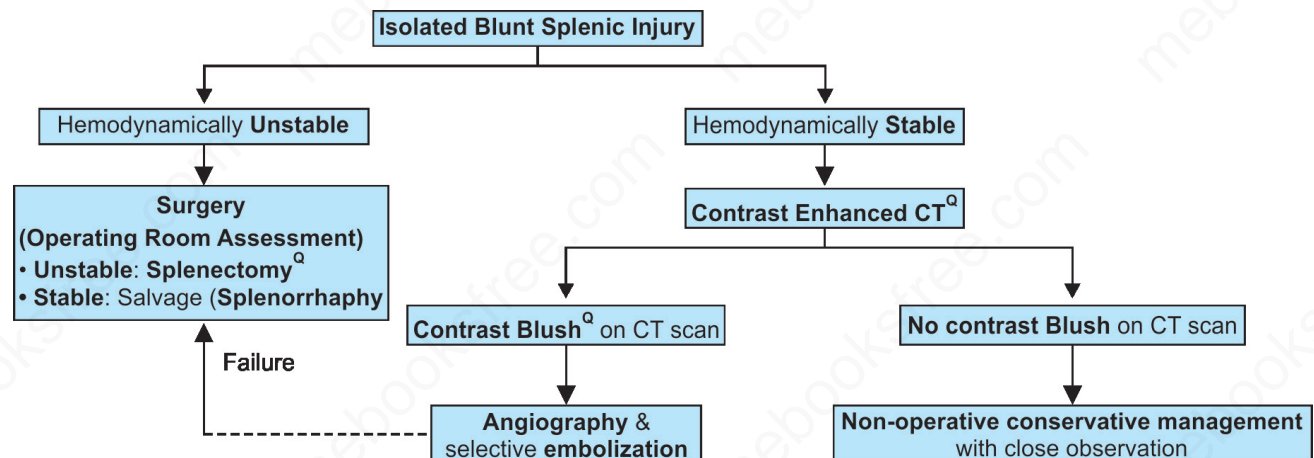
63. Ans. a. Conservative management (Ref: Sabiston 19/e p459-461; Schwartz 9/e p175; Bailey 25/e p1086-1088; Blumgart 5th/1806-1814; Shackelford 7/e p1479-1487)

Explanation is given in chapter no. 3 Liver.

SPLENIC INJURIES

64. Ans. c. Continue the conservative treatment and take subsequent measures on monitoring the patient (Ref: Trauma Manual by Moore and Mattox 4th/252)

As the patient is hemodynamically unstable, immediate surgical exploration should be done.



65. Ans. a. Observation

66. Ans. b. Spleen is most common organ to be involved, d. Cullen's sign seen

67. Ans. d. Continuation of conservative treatment under close monitoring system and subsequent surgery if further indicated

68. Ans. a. Partial splenectomy cannot be done

69. Ans. c. CT scan

Splenic trauma is discussed in chapter no. 20 Spleen.

70. Ans. a. Splenic injury

71. Ans. d. Conservative management

STOMACH, DUODENUM AND PANCREATIC INJURIES

72. Ans. c. Blood in stomach is always related to gastric injury (Ref: Sabiston 19/e p461-462; Schwartz 9/e p178; Bailey 25/e p348)

Blood in stomach is suggestive of injury to the stomach but it is not always due to stomach injury.

Blood in stomach may result from injury to adjacent gastrointestinal tract such as the esophagus or from stress ulcerations.

GASTRIC INJURIES

- Gastric injuries are most commonly results from penetrating trauma^Q.
- Most common treatment of penetrating gastric injuries is simple debridement and suturing^Q.
- Stomach has a rich blood supply, so healing in gastric injuries is good and poses no special problem.

73. Ans. b. Pancreaticoduodenectomy (Whipple's operation) (Ref: Sabiston 19/e p462-463, 1545; Schwartz 9/e p179; Bailey 25/e p1137-1138; Shackelford 7/e p1234-1239)

Explanation is given in chapter no. 8 Pancreas.

CHEST TRAUMA

74. Ans. b. Tracheo-bronchial rupture 75. Ans. a. Tracheobronchial injury (Ref: Sabiston 19/e p453)

- Tracheobronchial injuries are so fatal that most patients die at the scene or during transport as a result of poor ventilation.

76. Ans. b. Immediate emergency room thoracotomy should be done (Ref: Sabiston 19/e p1667; Schwartz 10/e p129,167, 9/e p107, 140; Bailey 26/e p848, 25/e p342)

PERICARDIAL TAMPONADE

- Pericardial tamponade must be differentiated from tension pneumothorax in the shocked patient with distended neck veins.
- It is most commonly the result of penetrating trauma^Q.
 - Characterized by Beck's Triad (MDH): Muffled heart sounds, Distended neck veins and Hypotension^Q

Diagnosis

- Chest X-ray: Enlarged heart shadow^Q
- Echocardiography: ECHO is diagnostic^Q showing fluid in the pericardial sac
- Central line: Rising central venous pressure^Q

Treatment

- Needle pericardiocentesis can buy enough time to move to the operating room^Q.
- Treatment of choice: Surgical pericardiotomy^Q

77. Ans. a. Tension pneumothorax, b. Cardiac tamponade (Ref: Sabiston 19/e p437, 1667; Schwartz 10/e p625, 9/e p107, 140; Bailey 26/e p848, 25/e p342)

Cardiac Tamponade	Tension Pneumothorax
<ul style="list-style-type: none"> • Hypotension and raised JVP and CVP is seen^Q • More common in penetrating injuries to chest^Q • Muffled heart sound is seen^Q 	<ul style="list-style-type: none"> • Hypotension and raised JVP and CVP is seen^Q • Less common • Respiratory distress (dyspnea and Tachypnea), resonant chest, absent breath sounds, mediastinal shift are seen^Q

78. Ans. b. Cardiac tamponade 79. Ans. b. Intrathoracic and abdominal bleed
80. Ans. a. Abdominal solid visceral organ injury (Ref: Sabiston 19/e p456; Schwartz 10/e p625, 9/e p; Bailey 25/e p)

- MC cause of hypotension in trauma patients: Hemorrhage^Q
- MC cause of shock after trauma is hypovolemia, and there are five places that a patient can lose large volume of blood: Externally, the chest, the abdomen, the retroperitoneum, and into muscle compartments (Blood on the floor and four more).^Q
- Fracture of lower ribs (T₉-T₁₂) are usually associated with splenic or hepatic injuries^Q
- Fracture of upper ribs (T₁-T₃), clavicle or scapula is usually associated with major vascular injuries^Q.

81. Ans. b. Tube thoracostomy 82. Ans. b. IPPV
83. Ans. c. Strapping 84. Ans. b. Rib fracture (Ref: Schwartz 10/e p625, 9/e p175)

- Schwartz says "Most common injury of the chest is fracture of one or more ribs, including fracture at the costochondral junction."^Q

85. Ans. c. Anterolateral thoracotomy

FLAIL CHEST

86. Ans. a. Fracture of 3 or 4 ribs, b. Chest wall moves inwards during inspiration, e. Ultimately leads to respiratory failure (Ref: Sabiston 19/e p1594; Schwartz 10/e p164,203, 9/e p138, 175; Bailey 26/e p355, 25/e p343)

FLAIL CHEST

- A flail chest occurs when a **segment of the chest wall does not have bony continuity with the rest of the thoracic cage^Q**.
- This condition usually results from blunt trauma associated with multiple rib fractures, i.e. **three or more ribs fractured in two or more places^Q**.
- The blunt force required to disrupt the integrity of the thoracic cage typically produces an **underlying pulmonary contusion** as well.

Clinical Features

- **On inspiration** the loose segment of the chest wall is **displaced inwards** and less air therefore moves into the lungs (**Paradoxical respiration^Q**)
- To confirm the diagnosis the chest wall can be observed for **paradoxical motion of a chest wall segment^Q** for several respiratory cycles and during coughing.

- **Voluntary splinting** as a result of pain, **mechanically impaired chest wall movement** and the associated **lung contusion** are all **causes of the hypoxia and respiratory failure^Q**.
- The patient is also at high risk of developing a **pneumothorax or hemothorax^Q**.

Diagnosis

- Diagnosis is made **clinically^Q**, not by radiography.

Treatment

- **Chest strapping or splinting should be avoided^Q**.
- **Currently, treatment** consists of **oxygen administration, adequate analgesia** (including opiates) or **epidural analgesia** and **physiotherapy^Q**.
- **IPPV (Intermittent positive pressure ventilation)** is **reserved for cases developing respiratory failure** despite adequate analgesia and oxygen^Q.

87. Ans. a. IPPV
88. Ans. a. Analgesics
89. Ans. b. Endotracheal intubation and mechanical ventilation
90. Ans. c. IPPV
91. Ans. d. Mediastinal shift
92. Ans. d. Strapping of chest
93. Ans. b. IPPV with oral intubation
94. Ans. d. Intermittent positive pressure ventilation
95. Ans. a. External fixation of flail segment and mechanical ventilation
96. Ans. d. Paradoxical movement may not be seen in conscious patients

DIAPHRAGMATIC INJURY

97. Ans. c. Smaller tears heal spontaneously and surgery is not required, e. Mask ventilation is encouraged in patient with massive visceral herniation (Ref: Sabiston 19/e p454-455; Schwartz 10/e p202-203, 9/e p175; Bailey 26/e p356-357, 25/e p344-345)

With bag and mask ventilation, the air may enter the herniated bowel loops producing more deterioration in respiratory distress.

DIAPHRAGMATIC INJURY

- Diaphragmatic injuries are often caused by **penetrating injuries^Q**.
- Patients sustaining penetrating injuries below the nipples and above the costal margins should be investigated to rule out diaphragmatic injury^Q.

Etiology

- **Penetrating trauma** (knife, bullet, repair of hiatus hernia)
- **Blunt trauma** (motor vehicle accident, fall from height, bout of hyperemesis):
 - Caused by **compressive force** applied to the **pelvis and abdomen**.
 - Rupture is **usually large**, with herniation of abdominal content into chest

Clinical Features

- **Most diaphragmatic injuries** are **silent** and the presenting features are those of injury to the surrounding organs^Q.

- Late complication: Herniation of abdominal contents into the chest^Q.

• Herniation of organ: Stomach^Q > Colon > Small intestine > Omentum > Spleen > Kidney and pancreas.

Diagnosis

- There is **no single standard investigation** to diagnose **diaphragmatic injuries**^Q.
- **Chest X-ray** after placement of a nasogastric tube may be helpful (as this may show the **stomach herniated into the chest**)
- Contrast study of upper or lower GIT, CT scan and diagnostic peritoneal lavage all lack positive or negative predictive value.

• **Most accurate evaluation** is by **video assisted thoracoscopy (VATS)** or **laparoscopy**^Q, offering the **advantage** of **allowing the surgeon to proceed to repair** and **additional evaluation** of the **abdominal organs**.

Treatment

- **Operative repair**^Q is recommended in all cases.
- All **penetrating diaphragmatic injury** must be **repaired via the abdomen** and not the chest, to **rule out penetrating hollow viscus injury**.

Bergvist Triad: Rib fracture + Fracture of spine/pelvis + Traumatic rupture of diaphragm

98. Ans. a. Advise diagnostic laparoscopy, b. Chest X-ray is useful, d. Late complication is herniation of abdominal content

99. Ans. c. Left side is more common

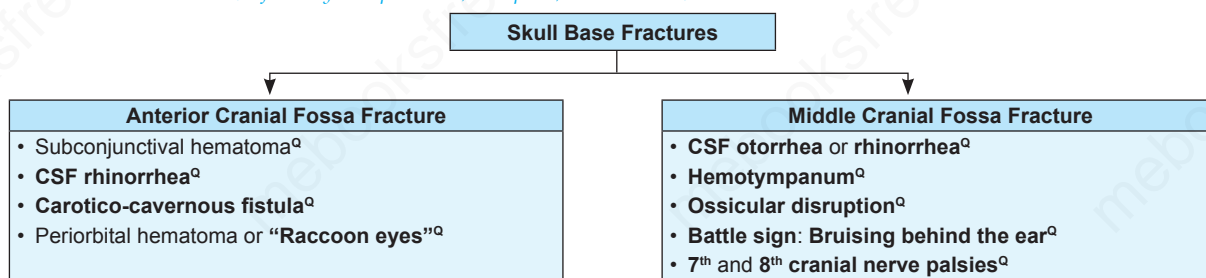
100. Ans. a. Laparoscopy, b. Chest X-ray

HEAD INJURY

101. Ans. a. Glasgow coma scale

102. Ans. a. Sub conjunctival hematoma (Ref: Harrison 18th/3381; Sabiston 19/e p1894)

103. Ans. d. Basilar fracture (Ref: Bailey 26/e p314-315, 25/e p302; 24th/595-599)



104. Ans. c. Altered mental status (Ref: Harrison 18th/2257)

- Early signs of elevated ICP includes drowsiness and a diminished level of consciousness.
- Coma and unilateral pupillary changes are late signs and require immediate intervention.

105. Ans. d. Many years after head injury (Ref: Harrison 18th/3256)

- Harrison says "The **superficial cortical scars** that evolve from contusions are **highly epileptogenic** and may later manifest as seizures, even after many years."

106. Ans. a. Chronic subdural hematoma (Ref: Harrison 18th/3379; Sabiston 19/e p439; Schwartz 10/e p1719-1720, 9/e p1525)

107. Ans. a. Extradural hemorrhage

108. Ans. a. Middle meningeal artery (Ref: Sabiston 19/e p439-441)

109. Ans. c. Fracture of petrous temporal bone (Ref: Bailey 25/e p302; 24th/595-599)

110. Ans. c. Antibiotics and observation

111. Ans. b. Extradural bleed

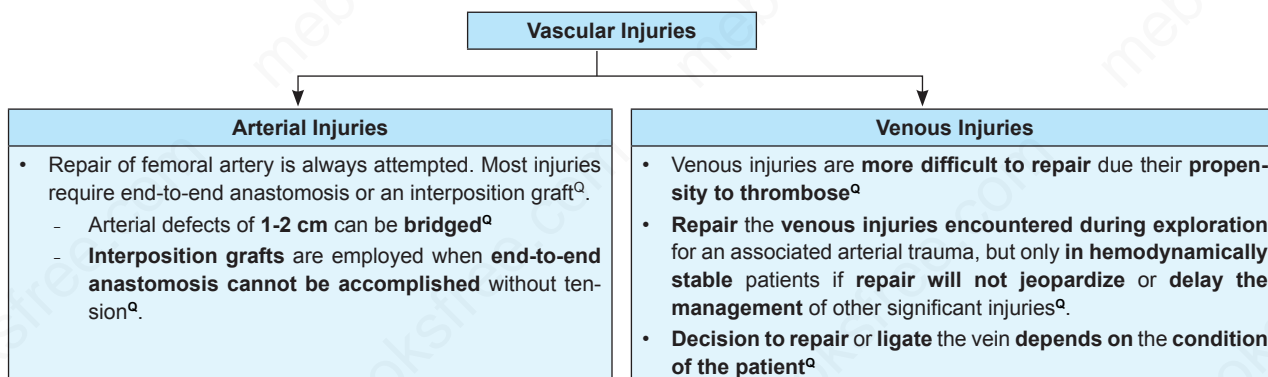
112. Ans. a. Subarachnoid hemorrhage

113. Ans. c. Eversion of galea aponeurotica

Discussed in chapter no. 33 Cerebrovascular disease.

VASCULAR INJURIES

114. Ans. a. Femoral artery repair with vein ligation, b. Repair of artery and vein (Ref: Sabiston 19/e p1789)



115. Ans. a. Vein repair with continuity

116. Ans. b. Repair of artery and vein

117. Ans. a. Most commonly due to deceleration injury, b. High mortality, c. Surgery definitive treatment, d. Aortography gold standard (Ref: Sabiston 19/e p1793-1794; Schwartz 10/e p214-215, 9/e p151, 172-173; Bailey 25/e p343; CSDT 11/e p257-259)

Discussed in chapter no. 26 Arterial Disorders.

118. Ans. c. Artery caught between fractured ends of bones

SEAT BELT INJURY

119. Ans. a. Seat belt can cause pancreato-duodenal injury, b. Late death is caused by sepsis, c. Damage Control Surgery (DCS) is used to control major bleeding and to prevent contamination of peritoneal cavity, e. In DCS, laparotomy is decided based on patient prognosis (Ref: Bailey 26/e p302, 25/e p1003-1004)

SEAT BELT INJURY

- If a car accident occurs when a seatbelt is worn, **sudden deceleration** can result in a **torn mesentery**^Q.
- Blunt trauma to the abdomen by **seatbelt injury** may **compress the pancreas over the vertebral column** and result in **pancreatico-duodenal injury**^Q
- If there is any **bruising of the abdominal wall**, or even marks of clothing impressed into the skin, laparotomy may be indicated^Q.

120. Ans. a. Duodenum

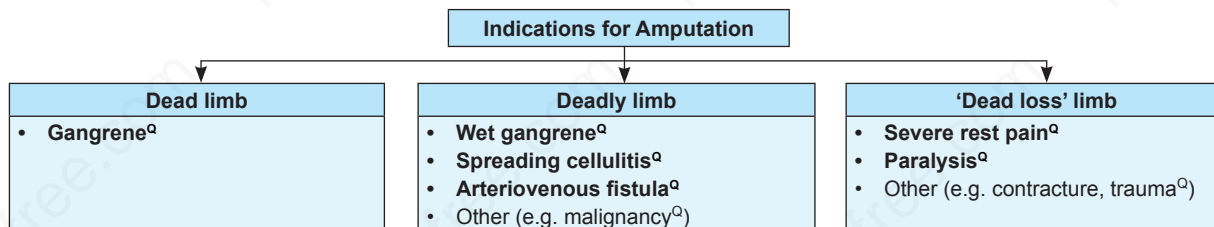
MISCELLANEOUS

121. Ans. d. Immobilize the cervical spine

122. Ans. b. Only one dose of TT

123. Ans. b. Vascular injury (Ref: Bailey 26/e p891, 25/e p915)

Bailey says "Amputation should be considered when part of a limb is dead, deadly or a dead loss. A limb is dead when arterial occlusive disease is severe enough to cause infarction of macroscopic portions of tissue, i.e. gangrene. The occlusion may be in major vessels (atherosclerotic or embolic occlusions) or in small peripheral vessels (diabetes, Buerger's disease, Raynaud's disease, inadvertent intra-arterial injection). If the obstruction cannot be reversed and the symptoms are severe, amputation is required."



124. Ans. a. X-ray of left lower limb and USG abdomen, b. Start IVE, Ryle's tube and catheterization, d. Grouping and cross matching of two unit of blood (Ref: Sabiston 19/e p456)

125. Ans. c. Removal of fragments of bone (Ref: <http://surgeryonline.wordpress.com/tag/missile-injuries/>)

MANAGEMENT OF MISSILE INJURIES

- In limb wounds, **exploration** is followed by **thorough wound excision**^Q, after which, with very few exceptions, the **wound should be left open**^Q.
- A minimal amount of skin edge (i.e. only that which has been contaminated) should be excised^Q around the entrance and exit wounds.
 - Foreign matter** should be **removed** from the wound^Q.
 - Delayed primary closure** should follow **within 4-7 days** after injury^Q.
- Dead muscle that does not bleed or contract, is mushy in consistency or has an unhealthy colour must be excised. These criteria comprise the '4 Cs' for muscle excision (Colour, Contractility, Consistency, Capillary bleeding)^Q
 - Bone shattered** by high-energy transfer will in many instances **still have attachment to periosteum or muscle**^Q.
 - Such fragments must not be discarded. Loss of bone may result in malunion (e.g. shortening) or nonunion^Q.

126. Ans. b. Abdominal aorta (Ref: Schwartz 9/e p160-164; 8th/60-61)

When bullet is shot above pubic symphysis in midline directed backwards, first organ to get injuries is abdominal aorta.

- Penetrating trauma caused by bullet injuries is not limited by elastic properties of the tissue and vascular injuries are far more common^Q.
- If exsanguinating hemorrhage originates near the midline in the retroperitoneum, direct manual pressure is applied with a laparotomy pad and the aorta is exposed at the diaphragmatic hiatus and clamped.
- For stable patients with large midline hematomas, clamping the aorta proximal to the hematoma is a wise precaution^Q.

127. Ans. a. Contractility of muscle, b. Color of muscle, c. Bleeding punctuate spots

128. Ans. c. Fixation of the bone (Ref: Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)

Bone is the first structure to be fixed in hand injuries.

SEQUENCE OF REPAIR IN HAND INJURIES (BE FAN OF VEINS)

- | | | |
|---|---------------------------------------|-------------------------------------|
| • Bone shortening and stabilization/fixation ^Q | • Extensor tendon repair ^Q | • Flexor tendon repair ^Q |
| • Arterial anastomoses ^Q | • Nerve repair ^Q | • Venous anastomosis ^Q |
| • Skin/wound closure ^Q | | |

129. Ans. a. Bone

130. Ans. a. Loss of sympathetic tone (Ref: Sabiston 19/e p441-444)

SPINAL CORD INJURIES

- High spinal cord injuries** can also **result in systemic hypotension** because of **loss of sympathetic tone**^Q.
- The patient will usually have **hypotension** and **relative bradycardia** and will show evidence of **good peripheral perfusion** on physical examination^Q.
- The term **neurogenic shock** is used but is somewhat of a **misnomer** because these patients are **typically hyperdynamic**, with **high cardiac output secondary to loss of sympathetic vascular tone**^Q.

Treatment

- Hypotension associated with high spinal injury** can be **treated by alpha-agonist phenylephrine**^Q.

131. Ans. b. Behind the esophagus (Ref: Seviitt S. The mechanisms of traumatic rupture of the thoracic aorta. Br J Surg 1977; 64; 166)

- The majority of blunt injuries to the **thoracic aorta** occur at **aortic isthmus** just distal to the left subclavian artery. Other locations include the **transverse arch**, **proximal ascending aorta**, and **descending aorta** just proximal to the diaphragm^Q.
- Tethering of aorta** by the **ligamentum arteriosum** is believed to account for the **high frequency of aortic injury in the isthmus region**^Q.

132. Ans. b. Absent pupillary light reflex and dilated pupils (Ref: Harrison 18th/2252)

BRAIN DEATH

- This is a state of **cessation of cerebral function** with **preservation of cardiac activity** and **maintenance of somatic function by artificial means**^Q.
- It is the only type of brain damage recognized as equivalent to death.

Criteria for Brain Death

- **Widespread cortical destruction** that is reflected by **deep coma** and **unresponsiveness** to all forms of stimulation^Q
- **Global brainstem damage** demonstrated by **absent pupillary light reaction** and by the **loss of oculovestibular and corneal reflexes**^Q
- **Destruction of the medulla**, manifested by **complete apnea**^Q.

133. Ans. c. 4th – 6th ribs (Ref: <https://storify.com/forensicmed/cardiopulmonary-resuscitation-related-rib-fracture>)

During resuscitation, artefacts of fractured ribs most commonly involve 4th – 6th ribs.

- "The vast majority (90%+) of fractures occur in ribs 2 to 7; fractures in the bony parts of rib numbers 1 and 8 to 10 are possible but probably very rare; it is difficult to see how fractures can occur in rib numbers 11 and 12 following standard manual CPR."- <https://storify.com/forensicmed/cardiopulmonary-resuscitation-related-rib-fracture>.

Transplantation

MULTIPLE CHOICE QUESTIONS

FLUIDS USED IN TRANSPLANTATION

- Amputated digits are preserved:
(AIIMS GIS Dec 2011, All India 92)
 - Cold saline
 - Cold Ringer Lactate
 - Plastic bag in ice
 - Deep freezer
- Allopurinol is used in organ preservation as:
(AIIMS May 2009)
 - Antioxidant
 - Preservative
 - Free radical scavenger
 - Precursor for energy metabolism

GRAFT

- Kidney transplantation is an: (DNB 2009, COMEDK 2006)
 - Allograft
 - Isograft
 - Xenograft
 - Synergic graft
- Transplantation between genetically different members of the same species is termed as: (COMEDK 2009)
 - Autograft
 - Isograft
 - Allograft
 - Xenograft
- A kidney transplant between identical twins is an example of: (COMEDK 2011)
 - Isograft
 - Allograft
 - Autograft
 - Xenograft
- Transplantation of kidney from mother to son is an example of: (AIIMS 84)
 - Autograft
 - Allograft
 - Isograft
 - Xenograft
- Graft from sister to brother is: (JIPMER 90)
 - Isograft
 - Allograft
 - Autograft
 - Heterograft
- An isograft indicates transfer of tissues between: (All India 93)
 - Unrelated donors
 - Related donors
 - Mynozygotic twins
 - From the same individual

- Skin grafting done on wound following major skin taken from twin brother: (Recent Question 2015, 2013)
 - Isograft
 - Allograft
 - Autograft
 - Xenograft

MATCHING AND GRAFT REJECTION

- Acute cellular rejection following solid organ transplantation occurs: (COMEDK 2011)
 - Within minutes to hours of transplantation
 - Within 48 hours of transplantation
 - Between 5 to 30 days of transplantation
 - Beyond 30 days after transplantation
- Hyperacute rejection is due to: (AIIMS Nov 2012)
 - Preformed antibodies
 - Cytotoxic T-lymphocyte mediated injury
 - Circulating macrophage mediated injury
 - Endothelitis caused by donor antibodies
- Most important HLA for organ transplantation and tissue typing: (MAHE 98)
 - HLA-A
 - HLA-B
 - HLA-C
 - HLA-D
- HLA matching is not necessary in which of the following organ transplantation? (JIPMER 2002)
 - Liver
 - Bone marrow
 - Pancreas
 - Kidney
- Immunological rejection is mediated by recipients:
 - Eosinophils
 - Lymphocytes
 - Neutrophils
 - Plasma cells
- Transplantation of which one of the following organs is most often associated with hyper-acute rejection? (UPSC 2006)
 - Heart
 - Kidney
 - Lungs
 - Liver
- Hyperacute rejection of graft is seen in? (MHSSMCET 2006, 2008, All India 2003)
 - Lung
 - Liver
 - Kidney
 - Pancreas

KIDNEY TRANSPLANTATION

- Renal transplantation is most commonly done in: (PGI Dec 97)
 - Chronic glomerulonephritis
 - Bilateral staghorn calculus
 - Horse shoe kidney
 - Oxalosis
- Commonest malignancy in renal transplant recipient is: (AIIMS Nov 95)
 - Skin cancer
 - Renal cell carcinoma
 - Non-Hodgkin's lymphoma
 - Hodgkin's lymphoma

19. Highest chance of success in renal transplant is seen when the donor is the? (NIMHANS 86, JIPMER 87, All India 88)

- a. Identical twin
- b. Father
- c. Mother
- d. Sister
- e. Husband

20. Principal cause of death in renal transplant patients:

(AIIMS 86, PGI 86, UPSC 88)

- a. Uremia
- b. Malignancy
- c. Rejection
- d. Infection

21. Investigation of choice in the early phase of renal transplant:

(Kerala 97)

- a. IVP
- b. Retrograde cystourethrogram
- c. Ultrasonogram
- d. CT Scan

22. Infection in renal transplant patient is usually caused by:

- a. CMV
- b. HIV (Rohtak 98)
- c. Herpes
- d. Salmonella
- e. Pneumococcus

23. Most common type of renal transplantation in India is:

- a. Allograft
- b. Autograft (All India 99)
- c. Isograft
- d. Xenograft

24. A patient had undergone a renal transplantation 2 months back and now presented with difficulty breath. X-ray showed bilateral diffuse interstitial pneumonia. The probable etiologic agent would be:

(AIIMS June 2002)

- a. CMV
- b. Histoplasma
- c. Candida
- d. Pneumocystis carinii

25. Most common disease caused by CMV in a post renal transplant patients:

(JIPMER 2011)

- a. Pyelonephritis
- b. Meningitis
- c. Pneumonia
- d. GI ulceration

26. An elderly male presents 2 months after renal transplantation with nephropathy. Which of the following can be a viral etiologic agent?

(AIIMS May 2014)

- a. Polymoma virus BK
- b. Human herpes virus type 6
- c. Hepatitis C
- d. Human papilloma virus, high risk types

27. In renal transplant, graft is placed in: ? (Recent Question 2014)

- a. Upper retroperitoneal space
- b. Iliac fossa
- c. Normal anatomical site
- d. None

LIVER TRANSPLANTATION

28. Expanded criteria for liver donation include all of the following except: (All India 2012)

- a. Taken from diseased individual after brain death
- b. Hepatitis B serology positive
- c. Age of donor may be >70 years
- d. Can be taken from individual with mild hepatic steatosis

29. Extended criteria for liver donation include all of the following except: (All India 2012, AIIMS GIS Dec 2011)

- a. Donor age > 70 years
- b. HBsAg positive donor
- c. Mild hepatic steatosis
- d. Donor after cardiac death

30. Indications of Liver transplantation are all, except:

(PGI June 2005)

- a. Biliary
- b. Sclerosing cholangitis
- c. Hepatitis A
- d. Cirrhosis
- e. Fulminant hepatic failure

31. Auxiliary orthotopic liver transplant is indicated for:

(AIIMS May 2008)

- a. Metabolic liver disease
- b. As a standby procedure until finding a suitable donor
- c. Drug induced hepatic failure
- d. Acute fulminant liver failure for any cause

32. Reduced liver transplants:

(GB Pant 2011)

- a. Given to two recipients after dividing into two parts
- b. Left lateral lobe divided and given to child
- c. Left lateral segment divided from segment 2 and given to child
- d. Part of liver segment transplanted into recipient depending upon requirement

33. All are scoring system used in liver transplant except:

- a. CTP
- b. PELD
- c. MELD
- d. MPI

34. Liver transplantation was first done by: (Recent Question 2014)

- a. Starzl
- b. Huggins
- c. Carrel
- d. Christian Bernard

35. All are marginal liver donor except:

- a. Older donor
- b. HBV core antibody positive donors
- c. Moderate steatosis
- d. Severe hepatitis

36. A 65-years old male with cirrhosis would be unsuitable for liver transplantation in the presence of:

- a. CTP 'B'
- b. HCC <5 cm
- c. Ascites
- d. Age >65 years
- e. Active alcohol abuse

37. Which of the following is not an indication for liver transplantation? (DNB 2002)

- a. Fatty liver
- b. HIV
- c. Willson's disease
- d. Primary hyperoxaluria

PANCREAS TRANSPLANTATION

38. The advantage of bladder drainage over enteric drainage after pancreatic transplantation is better monitoring of:

(All India 2009)

- a. HBA,C levels
- b. Amylase levels
- c. Glucose levels
- d. Electrolyte levels

39. Site of transplantation in islet cell transplant for diabetes mellitus:

(PGI 84)

- a. Forearm muscles
- b. Pelvis
- c. Thigh
- d. Injected into the portal vein

SMALL INTESTINE TRANSPLANTATION

40. All are true about intestinal transplant except:

(JIPMER GIS 2011)

- a. Principal barrier to widespread application is vigorous rejection reactions
- b. Severe form of GVHD occurs when T cells of graft respond to foreign HLA cells
- c. Uniquely dangerous complication is loss of protective mucosal barrier, bacterial translocation and severe sepsis
- d. Majority of intestinal grafts are multivisceral grafts

EXPLANATIONS

FLUIDS USED IN TRANSPLANTATION

1. Ans. c. Plastic bag in ice (Ref: Sabiston 19/e p1973; Schwartz 9/e p1622)

- The amputated digits are cleansed under saline solution, wrapped in saline moistened gauze, and placed in a plastic bag^Q.
- The plastic bag containing the part is then placed on (not packed in) a bed of ice in a suitable container^Q.
- The amputated part should never be immersed in nonphysiological solution such as antiseptics or alcohol.

2. Ans. c. Free radical scavenger (Ref: Schwartz 9/e p282; Bailey 26/e p1421, 25/e p1418)

ORGAN PRESERVATION SOLUTION

- Liver, pancreas and kidney can be successfully preserved for upto 2 days by flushing the organ with University of Wisconsin solution and storing them at hypothermia (0-50C)^Q.

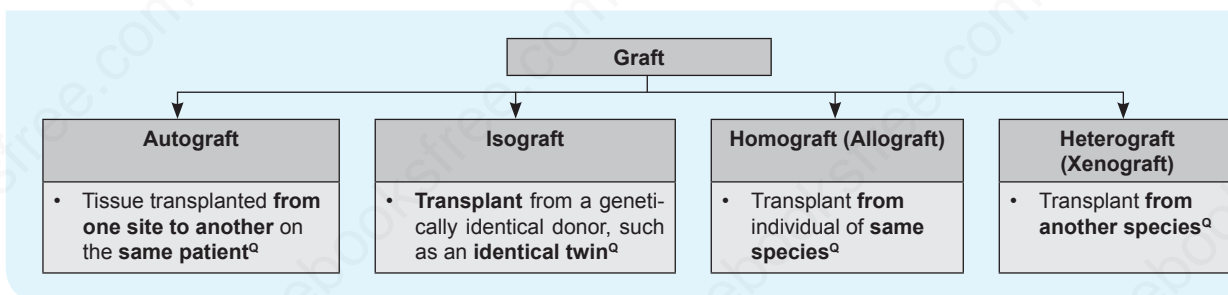
UNIVERSITY OF WISCONSIN SOLUTION

- UW solution: Cationic composition (high potassium and low sodium) mimics intracellular levels^Q to minimize diffusion down electrochemical gradients.
- UW solution (marketed as Viaspan) contains high level of potassium and adenosine^Q.

Special composition of UW solution	
Lactobionate and raffinose	• Minimizes cell swelling ^Q
Hydroxyethyl starch	• Prevention of the extracellular space expansion ^Q
Glutathione	• Anti-oxidant ^Q
Allopurinol	• Free radical scavenger ^Q
Adenosine	• Precursor for energy metabolism ^Q

GRAFT

3. Ans. a. Allograft (Ref: Schwartz 9/e p273; Bailey 26/e p1408, 25/e p1408)



4. Ans. c. Allograft

5. Ans. a. Isograft

6. Ans. b. Allograft

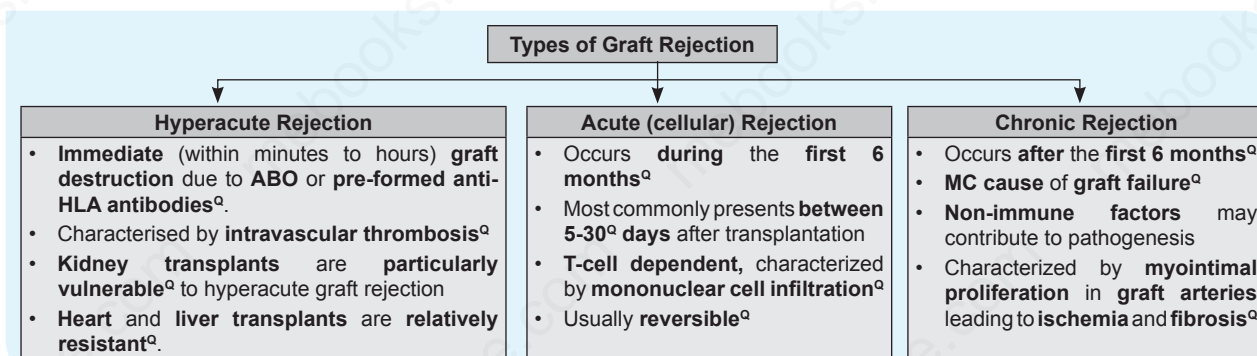
7. Ans. b. Allograft

8. Ans. c. Mynozygotic twins

9. Ans. a. Isograft

MATCHING AND GRAFT REJECTION

10. Ans. c. Between 5 to 30 days of transplantation (Ref: Schwartz 9/e p274-275; Bailey 26/e p1408-1412, 25/e p1408-1412)



11. Ans. a. Preformed antibodies

12. Ans. d. HLA-D (Ref: Bailey 26/e p1409-1412, 25/e p1408-1412)

HLA ANTIGENS

- In organ transplantation, **HLA-A, -B** and **-DR** are the **most important antigens** to take into account when matching donor and recipient in an attempt to reduce the risk of graft rejection
 - **HLA matching** has a relatively small but **definite beneficial effect** on renal allograft survival (**HLA-DR^Q > HLA-B > HLA-A**).
 - Are the **MC cause of graft rejection**^Q
 - Their physiological function is to act as **antigen recognition units**
 - Are **highly polymorphic** (amino acid sequence differs widely between individuals)
 - **Anti-HLA antibodies** may cause **hyperacute rejection**^Q
- In the case of liver transplants, **HLA matching does not confer an advantage**^Q
 - Although it is **beneficial in cardiac transplantation**, it is **not practicable** because of the relatively small size of the recipient pool and the short permissible cold ischemic time^Q.

13. Ans. a. Liver

14. Ans. b. Lymphocytes (Ref: Bailey 25/e p1409)

- The **cellular effectors of graft rejection** include **cytotoxic CD8 T cells**^Q, which **recognize donor HLA class I antigens** expressed by the graft and **cause target cell death** by releasing lytic molecules such as **perforin** and **granzyme**.

15. Ans. b. Kidney

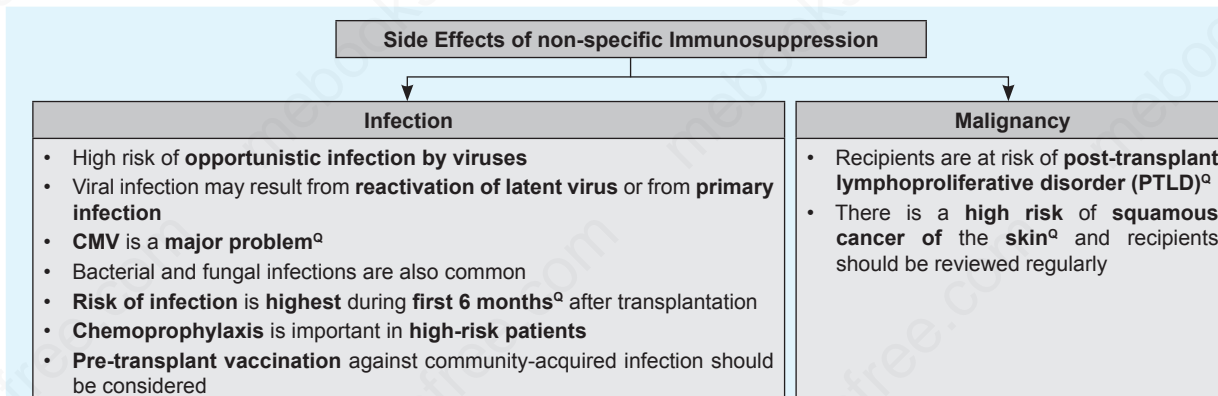
16. Ans. c. Kidney

KIDNEY TRANSPLANTATION

17. Ans. a. Chronic glomerulonephritis (Ref: Campbell 10/e p1226-1227)

Most Common Cause of End-stage Renal Disease
<ul style="list-style-type: none"> • Diabetes mellitus > Hypertension > Glomerulonephritis^Q

18. Ans. a. Skin cancer (Ref: Bailey 26/e p1415-1416, 25/e p1415-1416)



19. Ans. a. Identical twin

20. Ans. d. Infection (Ref: Campbell 10/e p1251-1253)

MOST COMMON CAUSE OF DEATH IN RENAL TRANSPLANT PATIENTS

- Heart disease^Q > Infection^Q > Stroke

21. Ans. c. Ultrasonogram: (Ref: Bailey 26/e p1425, 25/e p1423)

VASCULAR COMPLICATIONS AFTER KIDNEY TRANSPLANTATION

- Vascular complications after renal transplantation are low, presents during the first week after transplantation with sudden pain and swelling at the site of the graft.
- Diagnosis is confirmed by Doppler ultrasonography^Q.
- Urgent surgical exploration is indicated and, in most cases, transplant nephrectomy^Q is required.

22. Ans. a. CMV

23. Ans. a. Allograft

24. Ans. a. CMV (Ref: Sabiston 19/e p647; Bailey 26/e p1416, 25/e p1416)

CMV INFECTION

- CMV is most important pathogen in clinical transplantation^Q.
- CMV infections usually occur after 30-50 days^Q after transplantation.

Clinical Features

- Fever, malaise, arthralgia, leukopenia and thrombocytopenia, hepatitis, interstitial pneumonitis^Q, enterocolitis and disseminated disease.

Diagnosis

- Invasive CMV infection with histologic evidence or a positive CMV culture from deep tissue specimens is confirmatory^Q
- Chest X-ray: Bilateral diffuse interstitial pneumonia^Q

Treatment

- IV ganciclovir^Q is the mainstay of treatment and is safe and effective for prophylaxis and treatment.

25. Ans. c. Pneumonia

26. Ans. a. Polyoma virus BK (Ref: Harrison 18/e p2333)

Polyoma virus BK can be an etiological agent in an elderly male, who presents 2 months after renal transplantation with nephropathy.

Polyoma BK Virus:

- BK virus is Polyoma virus associated with nephropathy, typically after 1-4 months after transplant.
- High levels of BK virus replication detected by PCR in urine and blood are predictive of pathology, especially in setting of renal transplantation.
- Urinary excretion of BK virus and BK viremia are associated with the development of ureteric strictures, Polyoma virus associated nephropathy (1-10% of renal transplant recipients), and (less commonly) generalized vasculopathy.
- Timely detection and early reduction of immunosuppression are critical and can reduce rates of graft loss related to Polyoma virus associated nephropathy from 90% to 10-30%.

Common Infections after Solid Organ Transplantation, by Site of Infection

Infected Site	Period after Transplantation		
	Early (<1 Month)	Middle (1-4 Months)	Late (>6 Months)
Donor organ	Bacterial and fungal infections of the graft, anastomotic site, and surgical wound	CMV infection ^Q	EBV infection ^Q (may present in allograft organ)
Systemic	Bacteremia and candidemia (often resulting from central venous catheter colonization)	CMV infection ^Q (fever, bone marrow suppression)	CMV infection ^Q , especially in patients given early posttransplantation prophylaxis; EBV proliferative syndromes (may occur in donor organs)
Lung	Bacterial aspiration pneumonia with prevalent nosocomial organisms associated with intubation and sedation (highest risk in lung transplantation)	<i>Pneumocystis</i> infection ^Q ; CMV pneumonia ^Q (highest risk in lung transplantation); <i>Aspergillus</i> infection ^Q (highest risk in lung transplantation)	<i>Pneumocystis</i> infection ^Q ; granulomatous lung diseases (nocardiae, reactivated fungal and mycobacterial diseases)

Kidney	Bacterial and fungal (<i>Candida</i>) infections (cystitis, pyelonephritis) associated with urinary tract catheters (highest risk in kidney transplantation)	Renal transplantation: BK virus infection (associated with nephropathy^Q); JC virus infection	Renal transplantation: bacteria (late urinary tract infections, usually not associated with bacteremia); BK virus (nephropathy^Q, graft failure, generalized vasculopathy)
Liver and biliary tract	Cholangitis	CMV hepatitis^Q	CMV hepatitis^Q
Heart	-	<i>Toxoplasma gondii</i> infection^Q (highest risk in heart transplantation)	<i>Toxoplasma gondii</i> infection^Q (highest risk in heart transplantation)
Gastrointestinal tract	Peritonitis, especially after liver transplantation	Colitis secondary to <i>Clostridium difficile</i>^Q infection (risk can persist)	Colitis secondary to <i>C. difficile</i> infection (risk can persist)
Central Nervous System	-	<i>Listeria</i> (meningitis); <i>T. gondii</i> infection	<i>Listeria</i> meningitis^Q; <i>Cryptococcus</i> meningitis; <i>Nocardia</i> abscess; JC virus-associated PML

27. Ans. b. Iliac fossa

LIVER TRANSPLANTATION

28. Ans. a. Taken from diseased individual after brain death (Ref: Sabiston 19/e p662)

Extended Deceased Donor Criteria	
<ul style="list-style-type: none"> Mild to moderate steatosis^Q Hepatitis C positive^Q Age >65 years^Q 	<ul style="list-style-type: none"> Hepatitis B core antibody positive^Q Non-heart-beating donor^Q

29. Ans. b. HBsAg positive donor

30. Ans. c. Hepatitis A (Ref: Harrison 18/e p2607-2608)

31. Ans. a Metabolic liver disease, d. Acute fulminant liver failure for any cause (Ref: Blumgart 5/e p1689-1693)

32. Ans. d. Part of liver segment transplanted into recipient depending upon requirement

33. Ans. d. MPI

34. Ans. a. Starzl

35. Ans. d. Severe hepatitis

36. Ans. e. Active alcohol abuse

Discussed in chapter no. 4 Liver.

37. Ans. b. HIV

PANCREAS TRANSPLANTATION

38. Ans. b. Amylase levels (Ref: Sabiston 19/e p675-679; Schwartz 10/e p340-344, 9/e p290-295; Bailey 26/e p1427, 25/e p1425-1426; Blumgart 5/e p1796-1805; Shackelford 7/e p1251-1260)

- Bailey 25/e p1425: 'Urinary drainage of the pancreas has the advantage that urinary amylase levels can be used to monitor graft rejection^Q

39. Ans. d. Injected into the portal vein (Ref: Bailey 26/e p1427, 25/e p1425)

- The islets are then purified from the dispersed tissue by density-gradient centrifugation and can be delivered into the recipient liver (the preferred site for transplantation) by injection into the portal vein^Q.

SMALL INTESTINE TRANSPLANTATION

40. Ans. d. Majority of intestinal grafts are multivisceral grafts (Ref: Sabiston 19/e p682-689; Schwartz 10/e p352-354, 9/e p1010; Bailey 25/e p1427-1428; Shackelford 7/e p1008-1012)

Discussed in chapter no. 13 Small Intestine.

HEART TRANSPLANTATION

41. Ans. d. 1967 (Ref: Bailey 25/e p1428)

- Barnard performed the first human heart transplant in Cape Town, South Africa, in 1967^Q.

42. Ans. a. Heart transplant

LUNG TRANSPLANTATION

43. Ans. d. All of the above (Ref: Sabiston 19/e p1589)

Indications of Lung Transplantation	
• COPD ^Q	• Primary pulmonary hypertension ^Q
• Alpha-1 antitrypsin deficiency ^Q	• Cystic fibrosis ^Q
• Pulmonary fibrosis ^Q	• Bronchiectasis ^Q

POST-TRANSPLANT INFECTIONS

44. Ans. a. EBV (Ref: Sabiston 19/e p648; Bailey 25/e p1415; Anantnarayan 8/e p475)

POST-TRANSPLANT LYMPHOPROLIFERATIVE DISORDER (PTLD)

- PTLD is associated with replication of EBV in B cells induced by enhanced immunosuppression, primarily observed in patients who have received more than one course of polyclonal antilymphocyte globulin (ALG) or monoclonal OKT3^Q.

Clinical Features

- Clinical presentation of PTLD includes fever, malaise and lymphadenopathy^Q

Diagnosis

- The diagnosis is made by tissue biopsy^Q.

Treatment

- Polyclonal PTLD: Discontinuation of immunosuppression and antiviral therapy^Q.
- Monoclonal PTLD: Radiation, chemotherapy and occasionally surgical resection. Antibody against CD20^Q represents a novel approach in treating monoclonal PTLD with favorable outcome.

MISCELLANEOUS

45. Ans. a. 1994 (Ref: www.medindia.net > Health Acts in India)

- Transplantation of Human Organ Act was passed by Government of India in 1994^Q.

46. Ans. c. Infection

47. Ans. b. Cephalosporin

48. Ans. a. To prevent graft rejection

49. Ans. d. Urinary bladder (Ref: Essentials of General Surgery by Lawrence 4/e p475)

Organs and Tissues that can be Transplanted at Present	
• Kidney ^Q	• Middle ear
• Lung ^Q	• Skin
• Liver ^Q	• Bone/tendons
• Pancreas and islet cells of Langerhans ^Q	• Bone marrow
• Heart and heart valves ^Q	• Blood vessels ^Q (most common saphenous vein ^Q)
• Cornea ^Q	

50. Ans. None >C (12 hours) (Ref: Bailey 26/e p1421)

- Optimal storage time for kidney should be <18 hours.

Maximum and Optimal Cold Storage Times		
Organ	Optimal storage time (hours)	Safe maximum storage time (hours)
Kidney	<18 ^Q	36 ^Q
Liver	<12	18
Pancreas	<10	18
Small intestine	<4	6
Heart	<3 ^Q	6 ^Q
Lung	<3 ^Q	8

51. Ans. c. Kidney

Anesthesia and Perioperative Complications

MULTIPLE CHOICE QUESTIONS

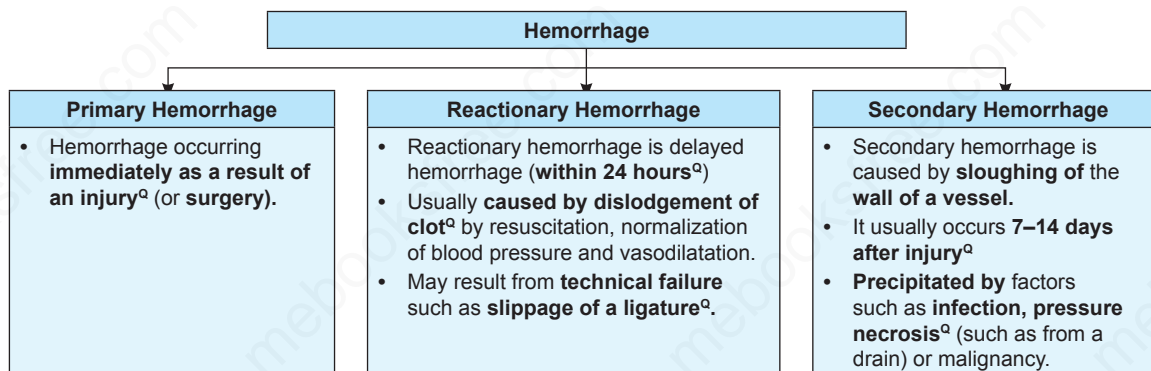
1. A young male presented with dyspnea, bleeding and petechial hemorrhage in the chest after 2 days following fracture shaft of the femur right side. Most likely cause is:
(UPPG 2008)
a. Air embolism
b. Fat embolism
c. Pulmonary thromboembolism
d. Amniotic fluid embolism
2. Reactionary hemorrhage occurs:
(Recent Question 2014, UPPG 2010 DPG 2008 Orissa 2011)
a. After 24 hours
b. After 48 hours
c. Within 24 hours
d. After 7 days
3. Secondary hemorrhage is due to: (DPG 2005)
a. Slipped ligature
b. Occurs 7-16 days after surgery
c. Due to disconnection of blood transfusion line
d. None of the above
4. Post-dural puncture headache is typically: (AIIMS June 2003)
a. A result of leakage of blood into the epidural space
b. Worse when lying down than in sitting position
c. Bifrontal or occipital
d. Seen within 4 hours of dural puncture
5. In the immediate post operative period, the common cause of respiratory insufficiency could be because of the following except: (AIIMS June 2003)
a. Residual effect of muscle relaxant
b. Overdose of narcotic analgesic
c. Mild hypovolemia
d. Myocardial infarction
6. A patient undergoing surgery suddenly develops hypotension. The monitor shows that the end tidal CO₂ has decreased abruptly by 155 mm Hg. What is the probable diagnosis? (AIIMS June 2003)
a. Hypothermia
b. Pulmonary embolism
c. Massive fluid deficit
d. Myocardial depression due to anesthetic agent
7. A patient developed respiratory distress and hypoxemia after central venous catheterization through internal jugular vein, reason for this is: (AIIMS Nov 2000)
a. Pneumothorax
b. Hypovolemia
c. Septicemia
d. Cardiac tamponade
8. An elective surgery is to be done in a patient taking heavy doses of aspirin. Management consists of: (All India 2000)
a. Proceed with surgery
b. Stopping aspirin for 7 days and then do surgery
c. Preoperative platelet transfusion
d. Intra operative platelet transfusion
9. Commonest artery for cannulation is: (PGI June 97)
a. Radial
b. Ulnar
c. Brachial
d. Cubital
10. A two months old infant has undergone a major surgical procedure. Regarding postoperative pain relief which one of the following is recommended? (All India 2006)
a. No medication is needed, as infant does not feel pain after surgery due to immaturity of nervous system
b. Only paracetamol suppository is adequate
c. Spinal narcotics via intrathecal route
d. Intravenous narcotic infusion in lower dosage
11. Air embolism in neural surgery maximum in which position?
a. Sitting
b. Supine (PGI Dec 2007)
c. Trendelenberg
d. Left lateral
e. Right lateral
12. Most common coagulopathy noted in surgical patients is:
a. Thrombocytopenia (AIIMS 86, 88)
b. Afibrinogenemia
c. Fibrinolysis
d. Factor VIII deficiency
13. Presence of trifluoroacetic acid (TFA) in urine indicates that volatile anesthetic agent used was:
(JIPMER 81, AIIMS 87)
a. Halothane
b. Methoxyflurane
c. Trichloroethylene
d. None of the above

EXPLANATIONS

1. Ans. b. Fat embolism (Ref: Apley's 8/e p535-536, Rockwood 6/e p553)

- Discussed in chapter no. 29 Thorax and Lung.

2. Ans. c. Within 24 hours (Ref: Bailey 26/e p19-20, 25/e p19-20)



3. Ans. b. Occurs 7-16 days after surgery

4. Ans. c. Bifrontal or occipital (Ref: Harrison 18/e p43)

POST-LUMBAR PUNCTURE HEADACHE

- Headache is **positional^Q**; it begins when the patient sits or stands upright and **resolves upon reclining**.
- **Location:** Occipitofrontal^Q
- **Nature:** usually a **dull ache** but may be **throbbing^Q**.
- **Recumbency** usually **improves** the headache^Q
- Post-LP headache usually **begins within 48 hours** but may be **delayed for up to 12 days^Q**.
- **Incidence:** 10-30%.

Treatment

- Beverages with **caffeine** may **provide temporary relief^Q**.
- **Initial treatment:** Bed rest^Q
- **Persistent pain:** IV caffeine^Q (500 mg in 500 mL saline administered over 2 hours) can be **very effective**.
- If a leak can be identified, an autologous blood patch is **usually curative^Q**.

5. Ans. c. Mild hypovolemia (Ref: Bailey 26/e p15, 25/e p15, 261)

Causes of Acute Post-Operative Shortness of Breath	
<ul style="list-style-type: none"> • MI and heart failure^Q • Chest infections^Q 	<ul style="list-style-type: none"> • Pulmonary embolism^Q • Exacerbation of asthma or COPD^Q

- In mild hypovolemia, the **systemic blood circulation** is maintained by shifting the blood from splanchnic circulation to the systemic circulation^Q.
- Healthy volunteers could have **10-15% of their blood volume removed** with no significant change in heart rate, BP, cardiac output or blood flow to the splanchnic bed^Q.

6. Ans. b. Pulmonary embolism (Ref: Harrison 18/e p2170-2177; Sabiston 19/e p295-297; Bailey 25/e p939)

7. Ans. a. Pneumothorax (Ref: Complications in Anesthesiology by Kirby (2007)/169)

8. Ans. b. Stopping aspirin for 7 days and then do surgery (Ref: www.facs.org > surgerynews > surgerynewsupdat 2012)

Aspirin should be stopped 1 week before surgery^Q.

NEW RECOMMENDATIONS

- Aspirin need not be stopped before surgery^Q
- Thyroid medications should be **continued^Q**
- Anti-hypertensives should be **continued** (even losartan)^Q

- OCPs should be **continued till day of surgery**^Q
- **Anti-depressants, anti-epileptics, anti-psychotics** should be **continued except TCA**, which should be **stopped 3 weeks before surgery** due to risk of **intra operative arrhythmia**^Q
- **Ticlopidine: 14 days** before surgery^Q
- **Clopidogrel: 7 days** before surgery^Q
- **Warfarin: 3 days** before surgery^Q
- **LMWH: 12 hours** before surgery^Q

9. Ans. a. Radial (Ref: *Lee Anesthesia 12/e p25*)

- **Arterial puncture and cannulation** is performed to measure PaO₂, PaCO₂, SpO₂ & pH to clarify the **acid-base** and **electrolyte** status.
- Any artery that can be compressed after puncture may be used (but **not end arteries**), usually the **radial**^Q (**preferred**), brachial or femoral.

10. Ans. d. Intravenous narcotic infusion in lower dosage (Ref: *Schwartz 9/e p1414*)

PAIN MANAGEMENT IN INFANTS

- For **minor procedures: Pacifiers** dipped in sucrose
- For **major procedures: IV narcotic agent**^Q (morphine or fentanyl)
- **Paracetamol** as **oral suspension** or as **peranal suppositories** can be used for mild to moderate pain.

11. Ans. a. Sitting (Ref: <http://emedicine.medscape.com/article/761367-overview>)

VENOUS AIR EMBOLISM

- **Venous air embolism** is a well known complication of **neurosurgical procedures** performed in **sitting position**^Q.
- **Operative site >5 cm above right atrium** is a risk factor for VAE^Q.
- **More common in posterior fossa surgeries**^Q

Management

- Once VAE is suspected, any **central line procedure** in progress should be **terminated immediately**^Q.
- Administer **100% oxygen**^Q
 - Promptly place the patient in **Trendelenberg (Head down) position** and **rotate towards the left lateral decubitus position**^Q. This maneuver helps trap air in the apex of the ventricle, prevents its ejection into pulmonary arterial system and maintains right ventricular output.
- Consider transfer to **hyperbaric chamber**^Q.

12. Ans. a. Thrombocytopenia (Ref: *Schwartz 10/e, 90-91, 1428, 9/e p72, 8/e p69*)

13. Ans. a. Halothane (Ref: en.wikipedia.org/wiki/Halothane)

PHYSICAL PROPERTIES OF HALOTHANE

- **No analgesia**^Q and **least pungent (non-irritant)**^Q
- **Pleasant to smell**, so excellent for induction in children^Q
- Halothane has **highest fat/blood coefficient**^Q 51 (can get deposited in adipose tissues after prolonged exposure)
- **Trifluoroacetic acid** is a **metabolite** and **found in urine**^Q

Robotics, Laparoscopy and Bariatric Surgery

MULTIPLE CHOICE QUESTIONS

LAPAROSCOPY

- The intra-abdominal pressure during laparoscopy should be set between: (DNB 2011, AIIMS Nov 2003)
 - 5-8 mm of Hg
 - 10-15 mm of Hg
 - 20-25 mm of Hg
 - 30-35 mm of Hg
- Gases for pneumoperitoneum: (PGI June 2007)
 - CO₂
 - N₂
 - Room air
 - N₂O
- Which gas is used in laparoscopy? (Recent Question 2015, DNB 2012, AIIMS June 94)
 - CO₂
 - N₂O
 - O₂
 - N₂
- Layers which are penetrated with trocar and cannula in production of pneumoperitoneum are: (PGI June 2005)
 - Skin and superficial fascia
 - Deep fascia
 - Rectus abdominis
 - Transversus abdominis
 - Rectus sheath
- Shoulder pain post laparoscopy is due to: (Recent Question 2014, AIIMS Nov 2007)
 - Subphrenic abscess
 - CO₂ retention
 - Positioning of the patient
 - Compression of the lung
- A lady presented in the emergency department with a stab injury to the left side of the abdomen. She was hemodynamically stable and a contrast enhanced CT scan revealed a laceration in spleen. Laparoscopy was planned, however, the patients PO₂ suddenly dropped as soon as the pneumoperitoneum was created. What is the most likely cause? (All India 2010)
 - Gaseous embolism through splenic vessels
 - Injury to the left lobe of the diaphragm
 - Inferior vena cava compression
 - Injury to colon
- Day care surgery can be done in: (PGI Nov 2010)
 - Lateral sphincterotomy
 - Rhinoplasty
 - Orchidectomy
 - Total thyroidectomy
 - Subcutaneous mastectomy
- Advantage of minimal access surgery: (PGI Nov 2010)
 - ↑ Heat loss
 - Better Hemostasis control

- Improved vision
- ↓ in wound pain
- Improved mobility

- Advantage of minimally invasive surgery over open surgery are all except: (Recent Question 2015)

- Wide/better field of vision
- Less operative time
- Less post-operative time
- Less post-operative morbidity

- Minimal invasive surgery includes all except: (MHPGMCET 2002)

- FESS
- Lap cholecystectomy
- Endoscopic sclerotherapy
- PCNL

- During laparoscopy, the intra-abdominal pressure is: (Recent Question 2014, MHSSMCET 2008)

- 5-10 mm Hg
- 12-15 mm Hg
- 15-20 mm Hg
- 20-25 mm Hg

- Instrument used to create artificial pneumoperitoneum in laparoscopy: (MHSSMCET 2008)

- Maryland forceps
- Veress needle
- Trocar
- All of the above

- Complications of laparoscopy: (MHSSMCET 2009)

- Diaphragmatic rupture
- Vascular injury
- Pneumothorax
- All of the above

- In surgical procedure NOTES, entry point is through: (Recent Question 2015)

- Abdomen
- Umbilicus
- Mouth
- Axilla

BARIATRIC SURGERY

- Cancers associated with excess fat intake are/is: (PGI Dec 2000)

- Breast
- Colon
- Prostate
- Lung
- Thyroid

- Physiological changes seen in laparoscopy include all except: (AIIMS May 2015)

- Increased ICP
- Decreased FRC
- Increased CVP
- Increased pH

17. **Bariatric surgical procedures include all except:** (WBPG 2015, AIIMS Nov 2008)
 a. Gastric banding b. Gastric bypass
 c. Biliopancreatic diversion d. Ileal transposition
18. **All of the following are primarily restrictive operations for morbid obesity, except:** (All India 2010)
 a. Vertical band gastroplasty
 b. Duodenal switch operation
 c. Roux-en-Y operation
 d. Laparoscopic adjustable gastric banding
19. **Complication (s) of obesity is/are:** (PGI Nov 2010)
 a. Venous ulcer
 b. Pulmonary embolism
 c. ↑Mortality
 d. Prostate cancer
 e. Pulmonary hypertension
20. **Morbid obesity is BMI greater than:** (MHSSMCET 2006)
 a. 25 b. 30
 c. 40 d. 45
21. **Irrespective of comorbidity, bariatric surgeries should be done when BMI is greater than:** (MHSSMCET 2008)
 a. 35 b. 40
 c. 45 d. 50
22. **The most effective bariatric surgery with treatment in the form of weight loss for morbid obesity is:** (MHSSMCET 2008)
 a. Roux-en-Y surgery
 b. Biliopancreatic diversion
 c. Vertical banded gastroplasty
 d. Any of the above
23. **In Duodenal switch operation, which of the following is not done?** (MHSSMCET 2010)
 a. Cholecystectomy
 b. Appendectomy
 c. Jejunioileal anastomosis
 d. Distal gastrectomy
24. **Peterson hernia:** (MHSSMCET 2010)
 a. An internal hernia occurring behind Roux-en-Y limb
 b. An internal hernia occurring through window in the transverse mesocolon
 c. Cervical hernia
 d. None
25. **Vertical banded gastroplasty also known as stomach stapling is done for:** (DNB 2010)
 a. Gastric carcinoma
 b. Achalasia cardia
 c. Perforated gastric ulcer
 d. Morbid obesity
26. **Bariatric surgery which results in maximum weight loss:** (MHCET 2016)
 a. Biliopancreatic diversion
 b. Gastric sleeve
 c. Gastric banding
 d. Gastric bypass
27. **Most commonly performed and acceptable method of bariatric surgery is:** (AIIMS May 2015)
 a. Biliopancreatic diversion
 b. Biliopancreatic diversion with ileostomy
 c. Laparoscopic gastric banding
 d. Roux-en-Y gastric bypass

EXPLANATIONS

LAPAROSCOPY

1. Ans. b. 10-15 mm of Hg (Ref: Sabiston 19/e p418-419; Schwartz 10/e p417, 9/e p361)

LAPAROSCOPY

- Needle used for pneumoperitoneum: Veress needle^Q
- Most commonly used gas: CO₂^Q
- Flow of gas: 1L/min^Q
- Intra-abdominal pressure: 12-15 mm Hg^Q
- Trocar is inserted at or just below the umbilicus^Q penetrating skin, superficial & deep fascia, fascia transversalis & parietal peritoneum.^Q

- Post-laparoscopy shoulder pain is due to CO₂ retention causing irritation of diaphragm & referred pain to the shoulder through phrenic nerve^Q.

2. Ans. a. CO₂, c. Room air, d. N₂O (Ref: Sabiston 19/e p418-419; Schwartz 10/e p417-419, 9/e p361)

GASES USED IN PNEUMOPERITONEUM

- First pneumoperitoneum was created by filtered room air^Q.
- CO₂ & N₂O are now preferred because of increased risk of gas embolism with room air^Q.
- CO₂: 200 times more diffusible than O₂, rapidly cleared from the body & lungs, doesn't support combustion^Q
- N₂O: 68% as rapidly absorbed in blood as CO₂, have mild analgesic effect, used for short operative procedures like sterilization or drilling^Q.
- For prolonged laparoscopic procedures, N₂O should not be preferred because it supports combustion better than air^Q.

3. Ans. a. CO₂

4. Ans. a. Skin and superficial fascia

5. Ans. b. CO₂ retention

6. Ans. a. Gaseous embolism through splenic vessels (Ref: Laparoscopic Surgery by Garcia & Jacobs/25)

- Sudden drop in pO₂ immediately during induction of pneumoperitoneum suggest the possibility of gas embolism as a result of entry of insufflating gas into circulation through the tear in splenic vessels.
- Gas embolism may also have resulted from inadvertent insertion of the trocar or veress needle into a vessel or abdominal organ.

GAS EMBOLISM

- Most commonly seen during induction of pneumoperitoneum at the time of insufflations of gas from unintended insufflations of gas directly into an open vein^Q.
- The more soluble a gas in the blood, the lower chances are for gas embolism.
- CO₂ is preferred for pneumoperitoneum as it is highly soluble in blood and is rapidly eliminated^Q.
- CO₂ Embolism: An initial rise in ET-CO₂ due to pulmonary excretion of absorbed CO₂ is followed by a sudden decrease due to fall in cardiac output^Q.

7. Ans. a. Lateral sphincterotomy, b. Rhinoplasty, c. Orchidectomy, e. Subcutaneous mastectomy (Ref: Bailey 25/e p198, 268)

DAY CARE SURGERY OR AMBULATORY SURGERY

- Surgical procedures suitable for ambulatory surgery should be accompanied by minimal postoperative physiologic disturbances and an uncomplicated recovery^Q.
- The primary predictors of prolonged stay or unanticipated admission after day-care surgery are related to the type of surgical procedure and associated complications (e.g. blood loss, incision pain, postoperative nausea & vomiting)^Q
- For superficial procedures (e.g. mastectomy,) reductions in both cost & per-operative complications have been observed when these procedures are performed on an outpatient basis^Q.

Specialty	Types of surgical procedures
Dental	• Extraction, restoration, facial fractures
Dermatology	• Excision of skin lesions
General	• Biopsy, endoscopy, excision of masses, hemorrhoidectomy, herniorrhaphy, laparoscopic cholecystectomy, adrenalectomy, splenectomy, varicose vein surgery ^Q

Gynecology	<ul style="list-style-type: none"> Cone biopsy, dilatation & curettage, hysteroscopy, diagnostic laparoscopy, laparoscopic tubal ligation^Q, uterine polypectomy, vaginal hysterectomy
Ophthalmology	<ul style="list-style-type: none"> Contract extraction, chalazion excision, nasolacrimal duct probing, strabismus repair, tonometry
Orthopedics	<ul style="list-style-type: none"> Anterior cruciate repair, knee arthroscopy^Q, shoulder reconstructions, bunionectomy, carpal tunnel release, closed reduction, hardware removal, manipulation under anesthesia and minimally invasive hip replacements
Otolaryngology	<ul style="list-style-type: none"> Adenoidectomy, laryngoscopy, mastoidectomy, myringotomy polypectomy, rhinoplasty, tonsillectomy, tympanoplasty
Pain clinic	<ul style="list-style-type: none"> Chemical sympathectomy, epidural injection, nerve blocks^Q
Plastic surgery	<ul style="list-style-type: none"> Basal cell cancer excision, cleft lip repair, liposuction, mammoplasty^Q (reductions & augmentations), otoplasty, scar revision, septorhinoplasty^Q, skin graft
Urology	<ul style="list-style-type: none"> Bladder surgery, circumcision, cystoscopy, lithotripsy, orchidectomy^Q, prostate biopsy, vasovasostomy, laparoscopic nephrectomy and prostatectomy

8. Ans. c. Improved vision, d. ↓ in wound pain, e. Improved mobility (Ref: Bailey 25/e p247-249)

Advantages of Minimal Access Surgery (MAS)	
<ul style="list-style-type: none"> Decrease in wound size^Q Reduction in wound infection, dehiscence, bleeding, herniation & nerve entrapment^Q Decrease in wound pain^Q 	<ul style="list-style-type: none"> Improved mobility^Q Decreased wound trauma Decreased heat loss^Q Improved vision^Q Faster recovery & shorter hospital stay

9. Ans. b. Less operative time
10. Ans. d. PCNL (Ref: Bailey 25/e p247-249)

Minimal Access Surgery (MAS) includes	
<ul style="list-style-type: none"> Laparoscopy^Q Thoracoscopy^Q Endoluminal endoscopy^Q 	<ul style="list-style-type: none"> Perivisceral endoscopy^Q Arthroscopy & intra-articular joint surgery^Q

11. Ans. b. 12-15 mm Hg
12. Ans. b. Veress needle
13. Ans. d. All of the above
14. Ans. c. Mouth (Ref: Bailey 26/e p103)

Natural Orifice Transluminal Endoscopic Surgery (NOTES)
<ul style="list-style-type: none"> NOTES is a technique whereby the peritoneal cavity is entered endoscopically, via a natural orifice (mouth, rectum, vagina) and the surgery is carried out using specialised endoscopic technology and techniques. NOTES cholecystectomy & appendectomy have been successfully carried out in humans. Additional procedures performed with NOTES: Staging of intra-abdominal malignancy, segmental colectomy, gastrojejunostomy

BARIATRIC SURGERY

15. Ans. a. Breast, b. Colon, c. Prostate (Ref: Sabiston 19/e p359; Schwartz 10/e p1099-1131, 9/e p951)

Increased Cancer Risk in Obese Patients (PEEL CP GO KBC)		
<ul style="list-style-type: none"> Prostate^Q Endometrial^Q Esophagus^Q Liver^Q 	<ul style="list-style-type: none"> Cervix^Q Pancreas^Q Gall Bladder^Q Ovarian^Q 	<ul style="list-style-type: none"> Kidney^Q Bile duct^Q Breast^Q Colon & rectum^Q

16. Ans. d. (Increased pH): Bailey 26th/94; <http://www.laparoscopyhospital.com/physiological-changes-laparoscopy.html>
Metabolic acidosis (decrease pH) from CO₂ absorption is the primary derangement with laparoscopy.

Physiological Effects of Laparoscopy	
Cardiovascular	<ul style="list-style-type: none"> ↑ Intra-abdominal pressure leads to ↑ CVP, ↑ PCWP, ↑ SVR and ↑ MAP which further ↓ Preload and ↑ Afterload, ultimately decreasing cardiac output^Q.
Pulmonary	<ul style="list-style-type: none"> Cephalad shift of diaphragm decreases FRC, chest wall compliance & tidal volume increasing the work of breathing^Q. Hypercapnia leading to increase in respiratory rate further adds to this.

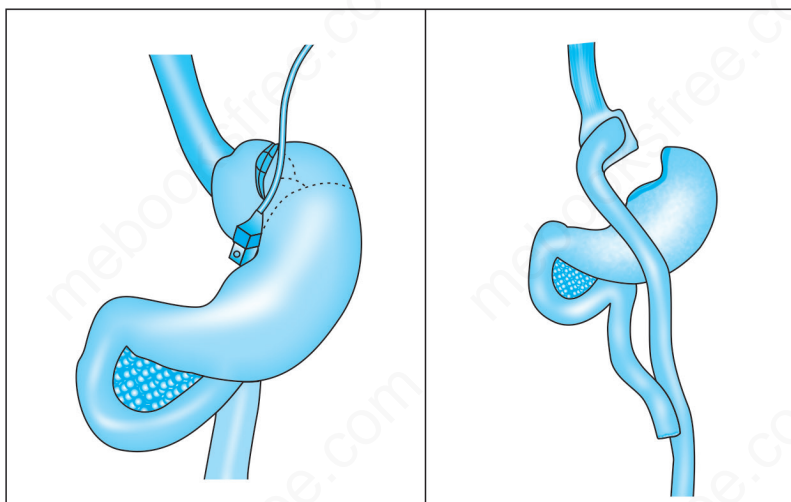
Renal	<ul style="list-style-type: none"> Increased IAP decreases renal flow, decreasing GFR & reduced urine output. Raised pCO₂ leads to RAAS stimulation. No long term change in GFR/UO.
Gastrointestinal	<ul style="list-style-type: none"> Decreased perfusion to intestines & stomach (as a result of increase IAP) decreases pH Decreased portal and hepatic flow leads to elevation of LFTs
Peripheral vascular	<ul style="list-style-type: none"> Incidence of DVT, PE is generally lower post-laparoscopic procedures probably secondary to improved prophylaxis Risk is increased with longer procedures and reverse Trendelenburg position.

17. Ans. d. Ileal transposition (Ref: Sabiston 19/e p363; Schwartz 10/e p1099-1131, 9/e p952)

BARIATRIC SURGERY

- Indication for Bariatric Surgery
 - Patients that have a BMI of 35 Kg/m² or more **with comorbidity**^Q
 - Those with a BMI of 40 Kg/m² or greater regardless of comorbidity^Q

Bariatric Operation	Mechanism of Action
<ul style="list-style-type: none"> • Vertical banded gastroplasty • Laparoscopic adjustable gastric banding (Safest and reversible) 	Restrictive ^Q
<ul style="list-style-type: none"> • Roux-en-Y gastric bypass (RYGB): MC performed procedure Now-a-days 	Largely Restrictive ^Q /Mildly Malabsorptive
<ul style="list-style-type: none"> • Bilopancreatic diversion • Duodenal switch 	Largely Malabsorptive ^Q /Mildly Restrictive



18. Ans. b. Duodenal switch operation

19. Ans. a. Venous ulcer, b. Pulmonary embolism, c. ↑ Mortality, d. Prostate cancer, e. Pulmonary hypertension (Ref: Sabiston 19/e p359; Schwartz 9/e p951)

Pathologic Consequences of Obesity	
System	Pathology
Health	• Increase in mortality ^Q
Endocrine	• Insulin resistance and type 2 diabetes mellitus ^Q
Reproductive	• Male hypogonadism, gynecomastia, menstrual abnormalities, polycystic ovarian syndrome
Cardiovascular	• Coronary disease , congestive heart failure
Pulmonary	• Obstructive sleep apnea, "obesity hypoventilation syndrome", pulmonary hypertension , DVT & pulmonary embolism ^Q
Hepatobiliary	• Nonalcoholic fatty liver disease, symptomatic gallstones
Bone, joint, and cutaneous disease	• Osteoarthritis, acanthosis nigricans, friability of skin, venous stasis & ulcers ^Q
Neurologic	• Carpal tunnel syndrome, pseudotumor cerebri, stroke

20. Ans. c. 40 (Ref: Schwartz 10/e p421-422, 9/e p950)

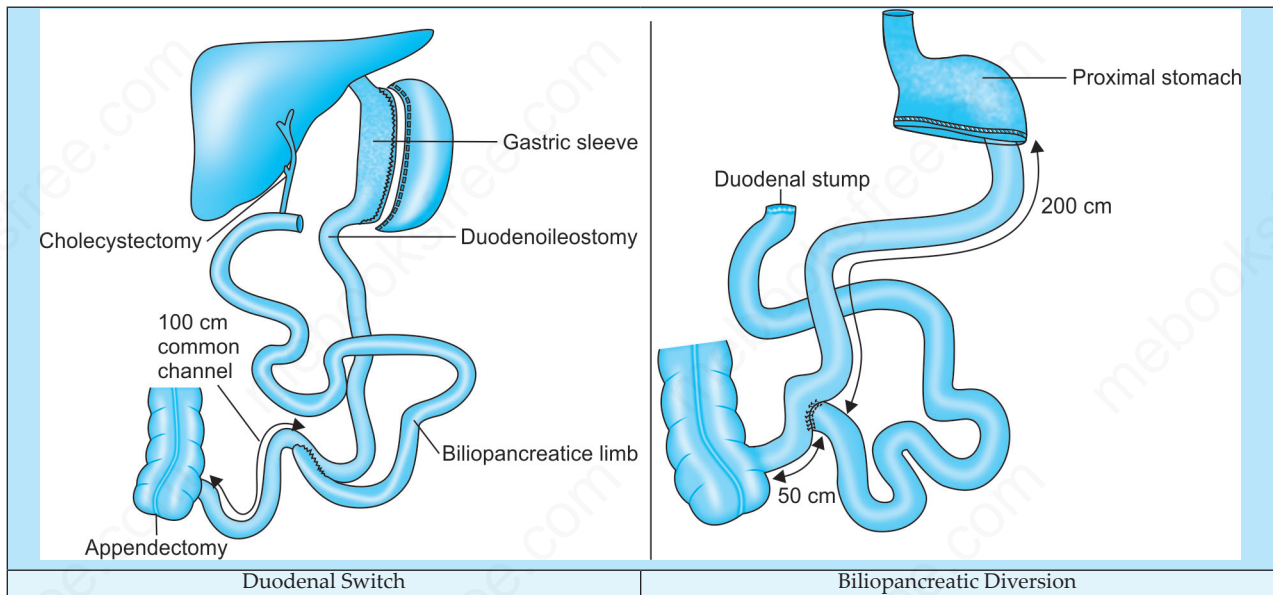
Advantages of Minimal Access Surgery (MAS)	
Category	BMI
Underweight	<18.5 ^a
Normal	18.5-24.9 ^a
Overweight	25.0-29.9 ^a
Obesity (Class I)	30-34.9^a
Severe obesity (Class II)	35-39.9^a
Morbid obesity (Class III)	40-49.9^a
Superobesity	>50^a

NEW GUIDELINES FOR ASIA

- **Overweight** if the BMI is **23 Kg/m²** or more^Q (International Standard is 25).
- **Obese** if the BMI is **25 Kg/m²** or more^Q (I.S. is 30).
- An Indian qualifies for **bariatric surgery** for obesity if the BMI is **32.5 Kg/m²** (I.S. 35) **with comorbidity^Q** or **37.5 Kg/m²** without comorbidity (I.S. 40)^Q.

21. Ans. b. 40

22. Ans. b. Biliopancreatic diversion (Ref: Sabiston 19/e p371; Schwartz 10/e p1103, 9/e p968)



BILIOPANCREATIC DIVERSION

- When the bile is diverted from the intestinal tract so that only the **distal 50 to 100 cm of ileum is used for bile reabsorption**, the procedure is termed a biliopancreatic diversion.
- **Most effective bariatric surgery^Q**, especially valuable in patients with **severe morbid obesity** or in those who have **failed to maintain weight loss** following gastric bypass surgery or restrictive procedures^Q.
- **Main side effect** with BPD: Patients usually have an increase of **2-4 bowel movements/day**, which in general are **more malodorous**, suggesting fat malabsorption.

23. Ans. d. Distal gastrectomy (Ref: Sabiston 19/e p372; Schwartz 10/e p1119-1121, 9/e p968)

- Sleeve gastrectomy is done in **duodenal switch operation** not the distal gastrectomy.

DUODENAL SWITCH OPERATION

- It involves a greater curvature **sleeve gastrectomy** with maintenance of the **continuity of the antrum, pylorus and first portion** of the duodenum.
- This allows for a **lower marginal ulcer rate** and a lower incidence of **dumping syndrome**.

Components of Duodenal Switch Operation

- | | |
|---|---|
| <ul style="list-style-type: none"> • Sleeve gastrectomy^Q • Duodenoileostomy^Q • Jejunioileal bypass^Q | <ul style="list-style-type: none"> • Cholecystectomy^Q • Appendectomy^Q |
|---|---|

24. Ans. a. An internal hernia occurring behind Roux-en-Y limb

Gibbon's hernia	• Hernia with hydrocele ^Q
Berger's hernia	• Hernia into pouch of Douglas ^Q
Beclard's hernia	• Femoral hernia through opening of saphenous vein ^Q
Amyand's hernia	• Inguinal hernia containing appendix ^Q
Ogilvie's hernia	• Hernia through the defect in conjoint tendon just lateral to where it inserts with the rectus sheath ^Q
Stammer's hernia	• Internal hernia occurring through window in the transverse mesocolon after retrocolic gastrojejunostomy ^Q
Peterson hernia	• Hernia under Roux limb after Roux-en-Y gastric bypass ^Q

PERIOPERATIVE MORTALITY IN BARIATRIC SURGERY

- MC cause of death within 30 days of bariatric surgery: Pulmonary embolism^Q (36%) > Cardiac complications (24%) > Anastomotic leaks (20%)
- MC cause of death in immediate post-operative period: Peritonitis secondary to anastomotic leak^Q (leak most commonly occurs at the gastrojejunostomy)

25. Ans. d. Morbid obesity

26. Ans. a. Biliopancreatic diversion

27. Ans. d. Roux-en-Y gastric bypass (*Sabiston 19th/363; Schwartz 9th/952; Harrison 19th/2398*)

Most commonly performed and acceptable method of bariatric surgery is Roux-en-Y gastric bypass

"The three restrictive-malabsorptive bypass procedures combine the elements of gastric restriction and selective malabsorption. These procedures are Roux-en-Y gastric bypass, biliopancreatic diversion, and biliopancreatic diversion with duodenal switch. Roux-en-Y is the most commonly undertaken and most accepted bypass procedure. It may be performed with an open incision or by laparoscopy." - Harrison 19th/2398

Sutures and Anastomoses

MULTIPLE CHOICE QUESTIONS

SUTURES

- Which of the following is a non absorbable suture?
(NEET Pattern, All India 2008)
 - Polypropylene
 - Vicryl
 - Catgut
 - Polydioxanone
- Absorbable sutures are:
(PGI June 2004)
 - Catgut
 - Silk
 - Polypropylene
 - Polyglycolic acid
 - Vicryl
- Surgically used suture material polydioxanone (PDS):
(COMEDK 2014)
 - A non-absorbable and remains encapsulated
 - Undergoes hydrolysis and complete absorption
 - Undergoes phagocytosis and enzymatic degradation
 - Is specifically used for heart valves of synthetic grafts
- Catgut is prepared from submucosal layer of the intestine of:
(Bihar PG 2014, DNB 2005, 2000, AIIMS 81, DNB 89)
 - Cat
 - Sheep
 - Human being
 - Rabbit
- Vicryl, the commonly used suture material is a: (UPSC 2000)
 - Homopolymer of polydioxanone
 - Co-polymer of glycolide and lactide
 - Homopolymer of glycolide
 - Homopolymer of lactide
- PDS is absorbed within:
(WBPG 2012, MAHE 2001)
 - 7 days
 - 21 days
 - 100 days
 - 225 days
- Surgically used suture material polydioxanone (PDS):
(WBPG 2012, COMEDK 2005)
 - Is non absorbable and remains encapsulated
 - Undergoes hydrolysis and complete absorption
 - Undergoes phagocytosis and enzymatic degradation
 - Is specifically used for heart valves or synthetic grafts
- The surgeon who introduce catgut in surgery was
(MAHE 2005)
 - Astley Cooper
 - Lord Lister
 - John Hunter
 - Syme
- Which of the following is a delayed absorbable synthetic suture material?
(DPG 2009 Feb)
 - Chromic catgut
 - Vicryl
 - Silk
 - Nylon

- Which of the following is not absorbable suture?
(DNB 2011, APPG 2008)
 - Catgut
 - Polyamide
 - Polyglactin
 - Polyester
- Which one of the following is used as preservative for packing catgut suture?
(AIIMS Nov 2002)
 - Isopropyl alcohol
 - Colloidal iodine
 - Glutaraldehyde
 - Hydrogen peroxide
- Which of the following is ideal time to removal of scalp suture?
(MHSSMCET 2009)
 - 3 days
 - 5 days
 - 7 days
 - 10 days
- Suture material used for laparoscopic choledochotomy repair:
(MHSSMCET 2010)
 - Silk
 - Catgut
 - Polyethylene
 - Vicryl
- Catgut is preserved in:
(Recent Questions 2013)
 - Glutaraldehyde
 - Isopropyl alcohol
 - Iodine
 - Certrimide
- Raw material used in nylon suture is:
(APPG 2015)
 - Polyethylene terephthalate
 - Polyamide polymer
 - Polybutylene terephthalate
 - Polyester polymer
- Which of the following suture has maximum tensile strength and minimum tissue reaction? (Recent Question 2015)
 - Polyglycaprone
 - Polypropylene
 - Polyglactine
 - Polydioxanone

ANASTOMOSIS

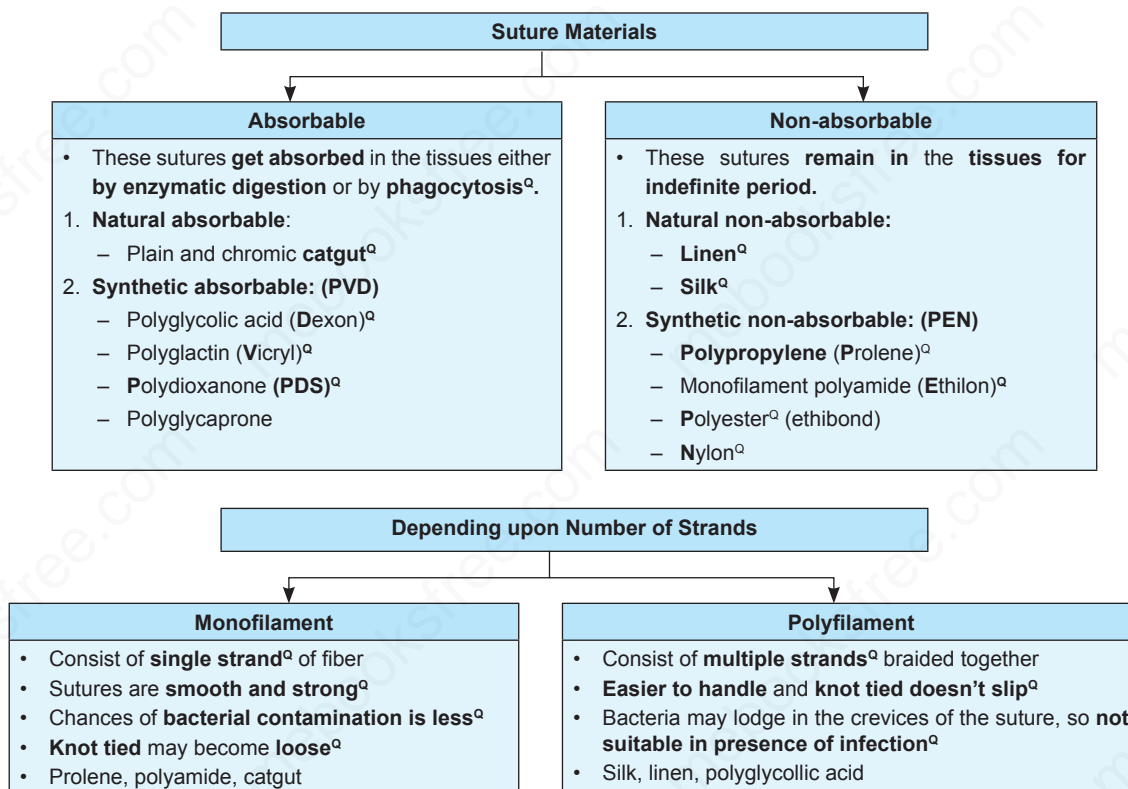
- Disparity of the bowel ends during end to end anastomosis is corrected by:
(Karnataka 2004)
 - Cheate's maneuver
 - Connell suture
 - Lambert suture
 - Czerny technique

18. In abdominal surgery Lembert suture refers to: (Karnataka 2006)
 a. Single layer suturing
 b. Sero-muscular sutures
 c. All coat intestinal suturing
 d. Skin suturing
19. Colonic anastomosis is most likely to rupture on which post-op day? (MHSSMCET 2005)
 a. 1-2 days b. 3-4 days
 c. After 7 days d. After 14 day
20. Regarding vascular surgery distal to popliteal artery, which of the following is true? (MHSSMCET 2006)
 a. Suture with polypropylene
 b. 6-0 suture used
 c. Needle pass from within outwards
 d. All the above
21. When knots are cut short, the free ends of 'ears' should be left at least ____ mm long? (MHSSMCET 2008)
 a. 1-2 mm b. 3-4 mm
 c. 5-6 mm d. 7-8 mm
22. The single layer extramucosal anastomosis was popularized by: (MHSSMCET 2008)
 a. Carrel b. Antoine Lambert
 c. Norman Matheson d. Emil Theodar Kocher
23. On table colonic lavage was used for first time in 1968 by: (MHSSMCET 2008)
 a. Muir
 b. Carrel
 c. Connell
 d. Lembert
24. Carrel's triangle is used in: (MHSSMCET 2008)
 a. Vascular anastomosis b. Bowel anastomosis
 c. Tendon repair d. Nerve repair
25. Intestinal anastomosis strength is provided by: (JIPMER 2015)
 a. Mucosa b. Sub mucosa
 c. Serosa d. Muscularis mucosa
26. Stapler used for MIPH: (Recent Questions 2013)
 a. Linear cutting stapler
 b. Circular cutting stapler
 c. Linear stapler
 d. Circular stapler
27. Tissue suturing glue contains: (Recent Question 2015)
 a. Cyanoacrylate
 b. Ethanolamine oleate
 c. Methacrylate
 d. Polychloroprene

EXPLANATIONS

SUTURES

1. Ans. a. Polypropylene (Ref. Bailey 26/e p37-38, 25/e p236-239)



2. Ans. a. Catgut, d. Polyglycolic acid, e. Vicryl
 3. Ans. b. Undergoes hydrolysis and complete absorption
 4. Ans. b. Sheep (Ref. Bailey 26/e p37-38, 25/e p236-239)

SUTURES

- John Hunter discovered **catgut**^Q.
 - Plain **catgut** is derived from **submucosa of sheep's intestine**^Q.
 - Plain **catgut** loses **50% tensile strength in 3 days**^Q and all tensile strength in 15 days and absorbed in 60 days^Q.
 - Isopropyl alcohol**^Q is used as **preservative for packing catgut sutures**.
- | |
|---|
| <ul style="list-style-type: none"> Vicryl (Co-polymer of glycolide and lactide) maintains tensile strength for 28-30 days^Q and gets absorbed in 80-90 days (Delayed absorption)^Q Vicryl is used for bile duct surgeries^Q. |
|---|
- PDS** sutures exhibit the **lowest affinity to the adherence of E. coli and Staphylococcus aureus**; **Dexon** sutures exhibit the **highest affinity** to these species.
 - Polydioxanone (PDS)** undergoes **hydrolysis and complete absorption within 180 days**.
 - Raw material used in nylon suture:** Polyamide polymer

5. Ans. b. Co-polymer of glycolide and lactide
 6. Ans. d. 225 days

7. Ans. b. Undergoes hydrolysis and complete absorption (Ref. Bailey 25/e p237)

60 days-plain catgut 1. 60-90 days → Chromic catgut, Vicry, Dexon (V, C, D) 2. 180 days → PDF 3. 90-120 days → poliglecaprone	Absorbedin	Sutures

Suture	Types	Raw material	Tensile strength	Absorption rate
Silk	Braided or twisted multifilament; Coated (with wax or silicone) or uncoated	Natural protein Raw silk from silkworm	Loses 20% when wet; 80-100% lost by 6 months	Fibrous encapsulation in body at 2-3 weeks ; Absorbed slowly over 1-2 year ^a
Catgut	Plain	Collagen derived from healthy sheep or cattle	Lost within 7-10 days	Phagocytosis & enzymatic degradation within 7-10 days ^a
Catgut	Chromic	Tanned with chromium salts to improve handling & resist degradation in tissue ^a	Lost within 21-28 days	Phagocytosis & enzymatic degradation within 90 days
Polyglactin (Vicryl)	Braided multifilament	Copolymer of lactide & glycolide ^a in a ratio of 90:10, coated with polyglactin & calcium stearate	Approx, 60% remains at 2 weeks; 30% remains at 3 weeks	Hydrolysis minimal until 5-6 weeks; Complete absorption 60-90 days ^a
Polyglyconate	Monofilament Dyed or undyed	Copolymer of glycolic acid & trimethylene carbonate ^a	Approx, 70% remains at 2 weeks; 55% remains at 3 weeks	Hydrolysis minimal until 8-9 weeks; Complete absorption 180 days ^a
Polyglycaprone	Monofilament	Copolymer of glycolite & caprolactone ^a	21 days maximum	90-120 days ^a
Polyglycolic acid (Dexon)	Braided multifilament Dyed or undyed Coated or Uncoated	Polymer of polyglycolic acid ^a	Approx, 40% remains at 1 weeks; 20% remains at 3 weeks	Hydrolysis ^a minimal at 2 weeks; significant at 4 weeks; Complete absorption 60-90 days ^a
Polydioxanone (PDS)	Monofilament dyed or undyed	Polyester polymer ^a	Approx, 70% remains at 2 weeks; 50% remains at 4 weeks; 14% remains at 8 weeks	Hydrolysis minimal at 90 days; Complete absorption 180 days ^a

8. Ans. c. John Hunter

9. Ans. b. Vicryl

10. Ans. d. Polyester

11. Ans. a. Isopropyl alcohol

12. Ans. c. 7 days (Ref. Sabiston 18/e p2134)

Guidelines for Day of Suture Removal by Area			
Body Regions	Removal	Body Regions	Removal
Eyelid	3-4	Chest, abdomen	8-10
Eyebrow	3-5	Ear	10-14
Nose	3-5	Back	12-14
Lip	3-4 ^a	Extremities	12-14
Face (other)	3-4 ^a	Hand	10-14
Scalp	6-8 ^a	Foot, sole	12-14

13. Ans. d. Vicryl

14. Ans. b. Isopropyl alcohol

15. Ans. b. Polyamide polymer

16. Ans. b. Polypropylene

ANASTOMOSES

17. Ans. a. Cheattle's maneuver (Ref. Bailey 26/e p42-44, 25/e p242-246)

The Cheattle split (making a cut into the anti-mesenteric border) may help to enlarge the lumen of distal, collapsed bowel¹.

WOUND CLOSURE & ANASTOMOSES

- As a general rule, **each suture** should be **separated by a gap** that is **twice the thickness of the skin**^Q.
- When **knots are cut short**, the **free ends** or 'ears' should be left **at least 1-2 mm long**^Q. This is particularly important with **monofilament non-absorbables**^Q.

- It has been suggested by **Jenkins** that a **suture length to wound length ratio of 4:1** indicates the **optimum size of tissue bites** and of **suture spacing**^Q.
- **Anastomosis of vessels** was **pioneered by Carrel**^Q.

BOWEL ANASTOMOSES

- **Lembert** described **seromuscular suture technique** for **bowel anastomosis** in 1826^Q.
- **Senn** advocated a **two-layer technique for closure**^Q.
- **Halsted** favoured a **one-layer extramucosal closure**^Q.
- **Connell** used a **single layer of interrupted sutures** incorporating all layers of the bowel^Q.
- **Kocher's method**, a **two layer anastomosis**, first a **continuous all-layer suture using catgut**, then an **inverting continuous** (or interrupted) **seromuscular layer suture using silk**, became the standard. There is evidence that **inversion is safest in bowel** (least likely to leak), although end-to-end staplers give an everted anastomosis without complication.
- The **single-layer extramucosal anastomosis**, advocated by **Matheson**^Q, causes the least tissue necrosis or luminal narrowing.
- The **Cheattle split** (making a **cut into the anti-mesenteric border**) may help to **enlarge the lumen of distal, collapsed bowel**^Q.
- **Bowel anastomotic leaks** are generally occur **on day 7**^Q.

18. Ans. b. Sero-muscular sutures

19. Ans. c. After 7 days

20. Ans. d. All of the above (Ref. Bailey 26/e p44-45, 25/e p244-246)

VASCULAR ANASTOMOSES

- **Vascular anastomoses** require **more precision** than bowel anastomoses as they must be **immediately watertight**^Q at the end of the operation when the clamps are removed.
- **Suture size depends on vessel calibre**:
 - 2/0 for **aorta**^Q
 - 4/0 for **femoral artery**^Q
 - 6/0 for **popliteal to distal arteries**^Q
 - **Microvascular anastomoses** are made using a loupe and an interrupted suture down to **10/0 size**

Anastomosis of Vessels

- **Polypropylene-like sutures** with indefinite integrity give the **best results**^Q
- **Intimal suture line** must be **smooth**^Q
- **Knots** must be **secure**^Q
- **Needle** must **pass from within outwards**^Q

21. Ans. a. 1-2 mm

22. Ans. c. Norman Matheson

23. Ans. a. Muir (Ref. www.ncbi.nlm.nih.gov > ... > Ann R Coll Surg Engl > v.75(3); May 1993)

- **On table colonic lavage** was used for first time in 1968 by **Muir**^Q.

24. Ans. a. Vascular anastomosis

25. Ans. b. Sub mucosa

26. Ans. b. Circular cutting stapler (Ref: Schwartz 9/e p1058)

Procedure for prolapse and hemorrhoidectomy (PPH) — aka MIPH — aka stapled emorrhoidectomy —

- Minimally invasive proctoscopic hemorrhoidectomy
 - In this procedure, a circular cutting stapler (PPH3) is used to excise a short. Circumferential segment of rectal mucosa proximal to dentate line, thus ligating venules feeding the hemorrhoides.

27. Ans. a. Cyanoacrylate (Ref; Bailey 26th/42)

Tissue glue
<ul style="list-style-type: none">• Tissue glue is also available based upon a solution of n-butyl- 2-cyanoacrylate monomer.• When it is applied to a wound, it polymerizes to form a firm adhesive bond• Wound does need to be clean, dry, with near perfect hemostasis and under no tension.• Specific uses: Closing a laceration on the forehead of a fractious child in Accident and Emergency thus dispensing with local anaesthetic and sutures.• Relatively expensive, it is quick to use, does not delay wound healing and is associated with an allegedly low infection rate.

Sterilization and Infection

MULTIPLE CHOICE QUESTIONS

STERILIZATION AND DISINFECTION

1. Ways to prevent a highly infectious disease transmitted by aerosol; precautions used: (PGI Dec 2007)
 - a. Isolation ward
 - b. Facemask
 - c. Keep isolated in a room with positive pressure
 - d. Keep isolated in a room with negative pressure
 - e. Cohort nursing
2. Use of all the following significantly decreases airborne infection in operating room except: (UPSC 2000)
 - a. Laminar air flow
 - b. Air-conditioning
 - c. Ultraviolet light
 - d. Microfilters
3. A chest physician performs bronchoscopy in the procedure room of the out patient department. To make the instrument safe for use in the next patient waiting outside, the most appropriate method to disinfect the endoscope is by: (All India 2003)
 - a. 70% alcohol for 5 min
 - b. 2% glutaraldehyde for 20 min
 - c. 2% formaldehyde for 10 min
 - d. 1% sodium hypochlorite for 15 min
4. All the following are sporicidal agents except: (JIPMER 2010)

a. Ethylene oxide	b. Phenol
c. Ozone	d. Glutaraldehyde
5. Flexible endoscopes are best sterilized with: (MHSSMCET 2008, MHPGMCET 2007)

a. Formaldehyde	b. Ethylene oxide
c. Gamma irradiation	d. Peracetic acid
6. Best disinfectant for endoscope is: (JIPMER 2014, 2012)

a. Hypochlorite	b. Formaldehyde
c. Glutaraldehyde	d. Chlorhexidine

PREVENTION OF INFECTION AND PROPHYLAXIS

7. What is the best time to give prophylactic antibiotic? (DPG 2007)
 - a. 1 day before surgery
 - b. At the time of skin incision
 - c. At the time of induction
 - d. 2 days before to 3 days after surgery
8. Regarding antibiotics true statement: (PGI June 2006)
 - a. No prophylaxis for clean contaminated surgery
 - b. No prophylaxis for gastric ulcer surgery
 - c. Prophylaxis for colorectal surgery
 - d. Local irrigation with antibiotic
9. When do we have to start antibiotics to prevent post-operative infection? (DPG 2011, JIPMER 2003)
 - a. 2 days before surgery
 - b. After surgery
 - c. 1 week before surgery
 - d. 1 hour before surgery and continue after surgery
10. Ideally, when should antibiotics be given during a surgery? (MHSSMCET 2011)
 - a. At the time of induction
 - b. At the time incision
 - c. After the surgery is over
 - d. A couple of days prior surgery
11. Preferred time for prophylactic antibiotic: (PGI June 2009)
 - a. 1 day before surgery
 - b. At the time of induction of anesthesia
 - c. I.V. during surgery
 - d. I.M. before 6 hours
 - e. Orally given
12. Optional timing of administration of prophylactic antibiotic for surgical patients is: (APPG 2015)
 - a. At the induction of anesthesia
 - b. Any time during the surgical procedure
 - c. One hour after induction
 - d. One hour prior to induction of anesthesia
13. Preoperative shaving is ideally done at: (JIPMER 81, DPG 86)
 - a. Evening before
 - b. Morning of operation
 - c. Just before operation
 - d. At operation table
14. In a postoperative intensive care unit, five patients developed postoperative wound infection on the same wound. The best method to prevent cross infection occurring in other patients in the same ward is to: (All India 2003)
 - a. Give antibiotics to all other patients in the ward
 - b. Fumigate the ward
 - c. Disinfect the ward with sodium hypochlorite
 - d. Practice proper hand washing

15. In a surgical post-op ward, a patient developed wound infection. Subsequently 3 other patients Developed similar infections in the ward. What is the most effective way of preventing the spread of infection? (AIIMS Nov 2001)

- Give IV antibiotics to all patients in the ward
- Proper hand washing of all ward personnel
- Fumigation of the ward
- Wash OT instruments with 1% perchlorate

16. The most effective method of reduction of incidence of institutional pediatric *Staphylococcus aureus* infection is: (COMEDK 2010)

- Mask and gown use with each suspected patient
- Meticulous hand washing before and after contact with patients
- Treatment of all culture-positive patients with vancomycin
- Routine isolation of culture-positive patients

17. Ampicillin prophylaxis is given in: (PGI 86)

- Rectal surgery
- Splenectomy
- Head and neck surgery
- Biliary surgery

SIRS AND MODS

18. A 60 years old lady underwent abdominal surgery and on the 4th post-operative day she was diagnosed to have systemic inflammatory response syndrome (SIRS). What are the features of SIRS? (UPSC 2004)

- Normal body temperature and normal respiratory rate
- WBC $>12 \times 10^9/L$ or $<4 \times 10^9/L$
- Respiratory rate >24 breaths/minute and heart rate >90 beats/minute
- Respiratory rate <10 breaths/minute

19. SIRS with established source of infection is known as:

- Sepsis
- Severe sepsis
- Septic shock
- MODS

20. Indicator of hypoperfusion in severe sepsis:

- Systolic BP <90 mmHg
- Lactic acidosis
- Oliguria
- All of the above

CELLULITIS AND PYOGENIC BACTERIAL INFECTION

21. True about management of necrotizing soft tissue infection: (PGI Nov 2011)

- Broad spectrum antibiotics should be started
- Penicillin is not usually effective due to resistant strains
- Immediate debridement + IV antibiotic has main role in treatment
- Hyperbaric O_2 is useful
- Amputation always indicated

22. False about cellulitis: (PGI Nov 2010)

- Caused by *Strep. pyogenes*
- Causes SIRS
- Localized infection
- Abscess if any should be managed conservatively
- I and D of abscess should be done

23. Extensive surgical debridement, decompression or amputation may be indicated in the following clinical setting except: (UPSC 2007)

- Progressive synergistic gangrene
- Acute thrombophlebitis

- Acute hemolytic streptococcal cellulitis
- Acute rhabdomyolysis

24. Cellulitis is most commonly caused by:

(Recent Question 2014, MCI Sept 2008, 2010)

- Clostridia*
- Staphylococci*
- Streptococci*
- H. influenza*

25. All of the following statements about necrotizing fasciitis are true, except: (All India 2009)

- Infection of fascia and subcutaneous tissue
- Most commonly caused by Group A beta hemolytic streptococci
- Most commonly site is perineum followed by trunk and extremities
- Surgical debridement is mandatory

26. Erysipelas is caused by: (PGI 88)

- Staph. aureus*
- Staph. albus*
- Strep. pyogenes*
- Hemophilus*

27. Following are true of erysipelas except: (AIIMS 84)

- Streptococcal infection
- Contagious and infectious
- Margins are raised
- Common in tropics

28. Chronic thick walled pyogenic abscess may be due to the following except: (AIIMS 84)

- Presence of a foreign body
- Prolonged antibiotic therapy
- Virulent strains of organism
- Inadequate drainage

29. Treatment of spreading streptococcal cellulitis is: (PGI 86)

- Erythromycin
- Penicillin
- Tetracycline
- Chloramphenicol

30. A carbuncle is treated by: (UPSC 95)

- Incision and drainage
- Cruciate incision and derroofing
- Antibiotics alone
- Wide excision

31. A boil is due to staphylococcal infection of: (UPPG 97)

- Hair follicle
- Sweat gland
- Subcutaneous tissue
- Epidermis

32. True about cellulitis of lower limb: (PGI 2000)

- Infection of skin and subcutaneous tissue
- Fever and malaise are common
- Margins are distinct
- Extrnal wound always present
- Involved site is red and hot

33. Best management of contaminated wound with necrotic material: (Recent Question 2014, AIIMS Nov 2013)

- Debridement
- Tetanus toxoid
- Gas gangrene serum
- Broad spectrum antibiotics

34. Which is not true of carbuncle? (JIPMER 86)

- Infective gangrene of subcutaneous tissue
- Caused by *staphylococcus*
- Diabetic are more prone
- Caused by *streptococcus*
- Penicillin and excision of necrotic tissue is treatment of choice

GAS GANGRENE

35. Gas gangrene is caused by: (JIPMER 2010)

- Cl. botulinum*
- Cl. difficile*
- Cl. perfringens*
- Cl. tetani*

36. True about treatment of gas gangrene after contaminated road traffic accident: (PGI Nov 2011)

- IV administration of anti-gas gangrene serum
- Penicillin
- Immediate suturing
- Surgical debridement
- Irrigation of anti-gas gangrene serum

37. Which of the following is not true about gas gangrene?

- Caused by Clostridium tetani (MHSSMCET 2011)
- Immunocompromised patients are most at risk
- Gas and smell are characteristic
- Antibiotic prophylaxis is essential when performing amputations to remove dead tissue

38. Hyperbaric oxygen is useful in: (Recent Question 2014, PGI 88)

- Tetanus
- Gas gangrene
- Frostbite
- Vincent's angina

39. Which of the following is not true of gas gangrene?

- It is caused by clostridium perfringens (AIIMS June 2003)
- Clostridium perfringens is a gram-negative spore-bearing bacillus
- Gas gangrene is characterized by severe local pain, crepitus and signs of toxemia
- High dose penicillin and aggressive debridement of affected tissue is the treatment of established infection

40. Best way to prevent gas gangrene is:

- Immunoglobulins (NEET 2013, AIIMS Nov 93)
- Hyperbaric oxygen
- Proper wound debridement
- Anti gas gangrene serum

41. Hypotension in a cause of gas gangrene is best treated by:

- Ringer lactate
- Normal saline (JIPMER 87)
- Plasma
- Whole blood

42. Treatment of contaminated wound in gas gangrene is:

- Debridement of wound (JIPMER 95)
- Systemic penicillin
- Metronidazole administration
- Peroxide dressings

43. Foaming liver is seen in: (PGI 88)

- Organophosphorus poisoning
- Actinomycosis
- Gas gangrene
- Anthrax

44. Treatment of contaminated wound of leg:

- Debridement and antibiotics (Recent Question 2015)
- Hyperbaric oxygen
- Amputation
- None

TETANUS

45. Tetanus is caused by: (PGI 88)

- Cl. tetani
- Cl. welchii
- Cl. edematis
- Cl. septicum

46. Following may be premonitory symptoms of tetanus except: (AIIMS 84)

- Sleeplessness
- Anxious expression
- Urinary incontinence
- Headache

47. Period of onset in tetanus refers to the time between:

- First injury to spasm (Karnataka 2006)
- First symptom to spasm
- First spasm to death
- Trismus to laryngeal spasm

TUBERCULOSIS

48. Regarding tuberculous lymphadenitis, which is correct?

- Seen in children and young adults
- Seen in the aged
- History of contact or drinking infected milk
- Mostly cervical
- All are the correct

49. Commonest cause of acute lymphadenitis in India:

- Barefoot walking (MAHE 2005)
- TB
- Staphylococcal skin infection
- Lymphoma

SYPHILIS

50. Moth eaten alopecia is seen with: (PGI 88)

- Leprosy
- Syphilis
- Fungal infection
- Cylindroma

51. Moon's molars seen with:

- Syphilis
- Leprosy
- Amyloidosis
- Actinomycosis

52. Which of the following about yaws is incorrect? (PGI 88)

- Caused by Treponema pertenue
- Spread by direct contact
- Sexually transmitted
- Penicillin is used as treatment

53. Painless effusions in joints in congenital syphilis is called: (All India 95)

- Clutton's joints
- Banton's joints
- Charcot's joints
- Synovitis

54. All are features of gummatous ulcer except: (APPG 96)

- Punched out edges
- Syphilitic in nature
- Wash leather slough
- Erythematous base

55. Thymus gland abscess seen in congenital syphilis is called: (PGI 80, AIIMS 86)

- Fouchier's abscess
- Politzer's abscess
- Douglas abscess
- Dubois abscess

56. A mentally retarded child aged 12 years has multiple, painful, discharging shiny white lesions around the anus. Which of the following is the most probable diagnosis:

- Lupus vulgaris
- Carcinoma (UPSC 97)
- Syphilitic condyloma
- Hemorrhoids

LEPROSY

57. Globi is seen in leprosy: (PGI 88)

- Tuberculoid
- Lepromatous
- Border line
- Borderline tuberculoid

58. Which of the following parts of the body is not affected by leprosy? (PGI 88)

- Testes
- Ovary
- Nasal mucosa
- Axilla

59. Leonine facies is seen in leprosy: (PGI 88)

- a. Tuberculoid
- b. Borderline
- c. Lepromatous
- d. Borderline tuberculoid

60. Most commonly affected peripheral nerve in leprosy is: (PGI 88)

- a. Ulnar
- b. Radial
- c. Medial
- d. Lateral Popliteal

ACTINOMYCOSIS

61. Actinomycosis is sensitive to: (PGI 88)

- a. Streptomycin
- b. Nystatin
- c. Penicillin
- d. Iodo-uridine

62. Most common form of actinomycosis is: (JIPMER 87, PGI 88)

- a. Fascio cervical
- b. Thoracic
- c. Right iliac fossa
- d. Liver

63. A patient with a fistula and chronic pus discharge from lower face and mandible is most commonly suffering from: (Kerala 89)

- a. Dental cyst
- b. Vincent's angina
- c. Ludwig's angina
- d. Actinomycosis

HIV AND COMPLICATIONS

64. In AIDS, lymphadenopathy is most often due to: (PGI Dec 97)

- a. TB
- b. Lymphoma
- c. Non specific enlargement of lymph node
- d. Kaposi's sarcoma

65. The HIV virus can be transmitted by the following routes, except: (Karnataka 94)

- a. Homosexual contact
- b. Intact skin
- c. Maternofetal
- d. Needle prick

66. The high risk groups for transmission of HIV virus include the following except: (Karnataka 94)

- a. Homosexuals
- b. Hemophiliacs
- c. Children of HIV mothers
- d. Health care workers

67. Universal (standard) precautions to be observed by surgeons for the prevention of hospital acquire HIV infection include the following except: (UPSC 2005)

- a. Wearing gloves and other barrier precaution
- b. Washing hands on contamination
- c. Handling sharp instruments with care
- d. Pre-operative screening of all patients of HIV

ANTHRAX

68. Most common form of anthrax is: (PGI 88)

- a. Wool sorters disease
- b. Alimentary type
- c. Cutaneous type
- d. None of the above

69. Malignant pustule occurs in: (KGMC 2011)

- a. Melanoma
- b. Gas gangrene
- c. Ovarian tumour
- d. Anthrax

HAND INFECTIONS

70. Most common hand infection is due to: (DPG 2008)

- a. E. coli
- b. Staph. aureus
- c. Streptococcus
- d. Pseudomonas

71. From the index finger infection goes to: (AIIMS Nov 96)

- a. Thenar space
- b. Hypothenar space
- c. Mid-palmar space
- d. Space of parona

72. Felon is: (Recent Question 2015, DPG 2005)

- a. Mid palmer space infection
- b. Terminal pulp space infection
- c. Infection of ulnar bursa
- d. Infection of radial bursa

73. Pulp space infection is known as: (MHSSMCET 2009)

- a. Felon
- b. Paronychia
- c. Perinoychia
- d. Onychonychia

74. Which of the following should not be treated with surgery? (MHPGMEET 2005)

- a. Felon
- b. Acute paronychia
- c. Herpetic whitlow
- d. Chronic paronychia

INTRA-ABDOMINAL INFECTIONS

75. Sub phrenic abscess, not seen is: (DPG 2006)

- a. Air fluid level
- b. Leucopenia
- c. More common on right side
- d. Associated with shoulder pain

76. In which of the following condition burst abdomen is commonly associated? (PGI Dec 2005)

- a. Drainage coming out through the wound
- b. Non absorbable sutures
- c. Interrupted sutures
- d. Medial incision is more risk (as compared to transverse incision)
- e. Transverse incision is better than paramedian incision

77. Infection of all the following structures can cause psoas abscess except: (DPG 2009 March)

- a. Vertebrae
- b. Appendix
- c. Hip joint
- d. Ribs

78. All of the following favor postoperative wound dehiscence except: (Karnataka 2005)

- a. Malignancy
- b. Vitamin B complex deficiency
- c. Hypoproteinaemia
- d. Jaundice

79. Which of the following is the most pathognomonic sign of impending burst abdomen?

- a. Fever
- b. Shock
- c. Pain
- d. Serosanguinous discharge

MISCELLANEOUS

80. Chronic burrowing ulcer is caused by: (All India 2007, AIIMS May 2008)

- a. Microaerophilic streptococci
- b. Peptostreptococcus
- c. Streptococcus viridians
- d. Streptococcus pyogenes

81. In a surgical patient, the causes of non-surgical infection:*(DPG 2010, PGI June 2004)*

- a. Lower RTI
- b. Wound infection
- c. Clostridium difficile diarrhea
- d. UTI

82. Mycotic abscesses are due to:*(All India 2006)*

- a. Bacterial infection
- b. Fungal infection
- c. Viral infection
- d. Mixed infection

83. Golden period for treatment of open wound in hours:

- a. 4
- b. 6
- c. 12
- d. 24

*(AIIMS 86, 88)***84. Sardonian grin is associated with:***(AIIMS 87)*

- a. Rabies
- b. Tetanus
- c. Bell's palsy
- d. Hemiplegia

85. Scrum pox is seen among players:*(PGI 88)*

- a. Football
- b. Hockey
- c. Rugby
- d. Chess

86. Multiple fistula in ano commonly occurs in:*(TN 91)*

- a. Tuberculosis
- b. Gonococcal proctocolitis
- c. LGV
- d. Colloid carcinoma of rectum

87. Follman's balanitis is caused by:*(Kerala 2003)*

- a. Trichomonas
- b. Candida
- c. H. Ducrey
- d. None

88. All of the following are perils of prolonged antibiotic therapy in intra abdominal sepsis except:

- a. Masking of general signs
- b. Subacute intestinal obstruction
- c. Malignant change
- d. Frozen pelvis

89. Pyrexia due to wound infection commonly occurs after:*(PGI 81, AMU 87)*

- a. Third post operation day
- b. Fifth post operation day
- c. Seventh post operation day
- d. Second post operation day

90. Hilton's method of treatment of an axillary abscess is advised because it:*(Karnataka 94)*

- a. Protects vital structure
- b. Ensures adequate drainage
- c. Hinders the spread of infection
- d. Allows local instillation of antibiotics

91. Hilton method is best used in:*(Recent Question 2015)*

- a. Breast abscess
- b. Axillary abscess
- c. Paronychia
- d. Pulp abscess

92. Antibiotoma is best treated by:*(JIPMER 95)*

- a. Partial resection
- b. Complete resection
- c. Aspiration
- d. Administration of antibiotics

93. True about surgical wounds:*(PGI Nov 2010)*

- a. No antibiotics required in clean surgery
- b. Incision of abscess is done in contaminated wound
- c. Spillage of stomach content converts a clean/contaminated case to a contaminated case
- d. In clean/contaminated wounds infection rate is 10%
- e. Hernia repair is contaminated wound

94. Anaerobic infection is precipitated by:*(MHPPGMCET 2001)*

- a. Trauma
- b. Impaired circulation
- c. Tissue necrosis
- d. All of the above

95. Hilton's method is used in:*(MHSSMCET 2005)*

- a. To minimize the scar
- b. To prevent injury to vital structure
- c. To have complete drainage
- d. To drain large abscesses

EXPLANATIONS

STERILIZATION AND DISINFECTION

1. Ans. a. Isolation ward, b. Facemask, d. Keep isolated in a room with negative pressure (Ref: *Prevention of Hospital Acquired Infection by WHO*)

PREVENTIVE MEASURE FOR HOSPITAL ACQUIRED INFECTION

- **Isolation:** Infective patients must be isolated in room with adequate ventilation and negative pressure^Q
- **Hospital staff:** Those who are suffering from skin disease, sore throat, common cold, ear infection diarrhea or dysentery and other infections ailments should be kept away from work until complete cured^Q.
- **Hand washing^Q:** The most common route of infection is via the hands^Q. Hands washing with soap and water may not be sufficient; a suitable disinfectant must be employed for hand washing^Q.
- **Dust control:** Hospital dust contains numerous bacteria and virus. Suppression of dust by wet dusting and vacuum (negative pressure) cleaning^Q are important control measure.
- **Disinfection:** the article used by the patient as well as patient's urine, feces, sputum should properly disinfect. Proper sterilization^Q of instrument should be enforced.
- **Control of droplet infection:** Use of face masks^Q, proper bad spacing, prevention of overcrowding and ensuring adequate lighting and ventilation are important control measure
- **Nursing technique:** Barrier nursing and task nursing have also been recommended to minimize cross infection.
- **Administrative measures:** There should be a hospital control infection committee^Q to form late policies regarding control of hospital acquired infection.

2. Ans. b. Air-conditioning

3. Ans. b. 2% glutaraldehyde for 20 min (Ref: *Bailey 24/e p135*)

Techniques of Sterilization	
Steam (121°C for 15 minutes)	• Surgical instruments ^Q
Ethylene oxide	• Heart lung machine ^Q , respirators, dental labs
Hot air oven	• Glass syringe ^Q , test tubes, flasks ^Q , cutting instruments
Irradiation (gamma rays)	• Industrial packaging ^Q
Paracetic acid (STERIS)	• Flexible endoscopes ^Q
Isopropyl alcohol	• Clinical thermometer ^Q
Beta propiolactone > Formaldehyde	• Fumigation of OT, labs, wards ^Q
2% Glutaraldehyde	• Endoscope (cystoscope, bronchoscope) ^Q
Autoclaving	• Culture media, suture materials except catgut ^Q

4. Ans. b. Phenol (Ref: *Anantnarayan 7/e p31*)

Sporicidal Agents	
• Ethylene oxide ^Q	• Halogenes ^Q
• Glutaraldehyde ^Q	• Ozone ^Q

5. Ans. d. Peracetic acid

6. Ans. c. Glutaraldehyde

PREVENTION OF INFECTION AND PROPHYLAXIS

7. Ans. c. At the time of induction (Ref: *Sabiston 19/e p251-252; Schwartz 10/e p142, 9/e p119, 222; Bailey 25/e p41*)

PROPHYLACTIC ANTIBIOTICS

- Antibiotics should be used when local wound defenses are not established (the decisive period).
- Ideally, maximal blood and tissue levels should be present at the time at which the first incision is made and before contamination occurs.

- IV administration at **induction^Q of anesthesia** is optimal.
- If induction is not mentioned in the option go for **30 minutes to 1 hour before surgery^Q**.

- In **long operations**, those involving the **insertion of a prosthesis**, when there is **excessive blood loss** or when **unexpected contamination** occurs, antibiotics may be **repeated 8 and 16 hours later^Q**.
- The use of the newer, **broad-spectrum antibiotics for prophylaxis should be avoided^Q**.
- **Benzylpenicillin^Q** should be used if **Clostridium** gas gangrene infection is a possibility
- Patients with **heart valve disease** or a **prosthesis** should be **protected** from bacteraemia caused by **dental work, urethral instrumentation or visceral surgery^Q**

8. Ans. c. Prophylaxis for colorectal surgery (Ref: Sabiston 19/e p251-252)

Prophylactic systemic antibiotics reduce infection and are clinically beneficial in the following circumstances	
<ul style="list-style-type: none"> • High-risk gastroduodenal procedures: Operations for gastric cancer, ulcer^Q, obstruction, or bleeding • High-risk biliary procedures: Operations in patients >60 years, CBD stones, or jaundice, previous biliary tract operations or endoscopic biliary manipulation • Resection and anastomosis of the colon^Q or small intestine • Cardiac procedures through a median sternotomy • Vascular surgery of the lower extremities or abdominal aorta^Q • Operations entering the oropharyngeal cavity^Q • Implantation of any permanent prosthetic material^Q 	<ul style="list-style-type: none"> • Amputation of an extremity with impaired blood supply^Q, particularly in the presence of a current or recent ischemic ulcer • Craniotomy • Any wound with known gross bacterial contamination^Q • Accidental wounds with heavy contamination and tissue damage^Q. • Injuries prone to clostridial infection because of extensive devitalization of muscle, heavy contamination, or impairment of the blood supply^Q

9. Ans. d. 1 hour before surgery and continue after surgery
10. Ans. a. At the time of induction
11. Ans. b. At the time of induction of anesthesia
12. Ans. a. At the induction of anesthesia
13. Ans. c. Just before operation
14. Ans. d. Practice proper hand washing (Ref: Bailey 25/e p43)

AVOIDING SURGICAL SITE INFECTIONS

- Staff should always **wash their hands** between patients^Q
- **Length of patient stay** should be **kept to a minimum^Q**
- **Preoperative shaving** should be **avoided** if possible^Q
- **Antiseptic skin preparation** should be **standardized^Q**
- Attention to theatre technique and discipline^Q
- **Avoid hypothermia** perioperatively and ensure **supplemental oxygenation** in recovery^Q

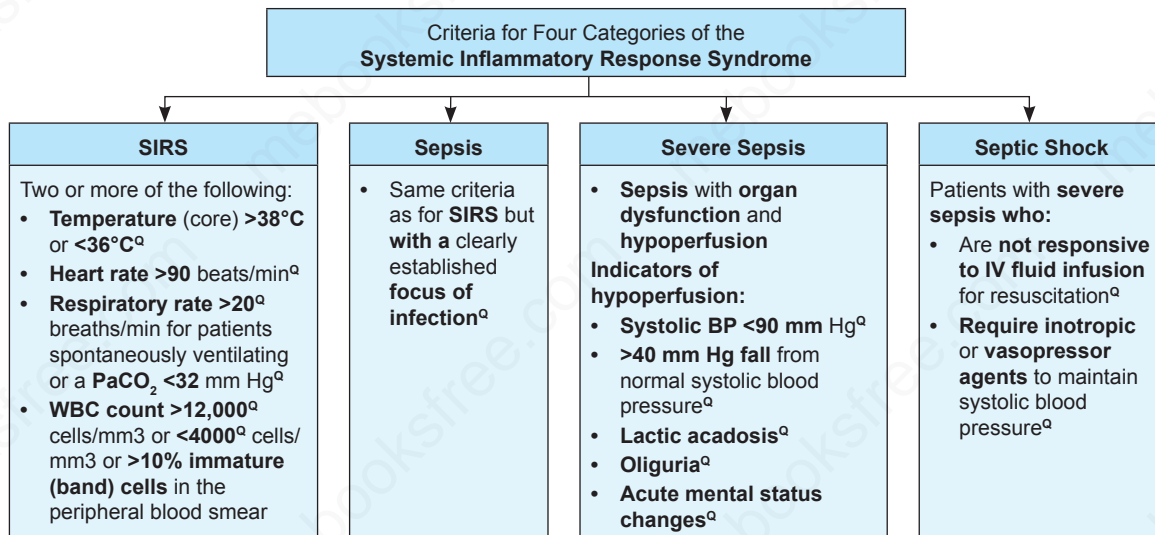
15. Ans. b. Proper hand washing of all ward personnel
16. Ans. b. Meticulous hand washing before and after contact with patients
17. Ans. d. Biliary surgery (Ref: www.ncbi.nlm.nih.gov/pubmed/8526441)

PROPHYLACTIC ANTIBIOTICS IN BILIARY SURGERY

- Prophylactic antibiotics in biliary surgery are designed to **reduce the incidence of postoperative wound infections**.
- The efficacy of antibiotics in the prevention of wound infections has been demonstrated with first, second and third generation cephalosporins, ampicillin^Q associated with clavulanate, ureido-penicillins, aminoglycosides, sulfonamides and quinolones.

SIRS AND MODS

18. Ans. b. WBC $>12 \times 10^9/L$ or $<4 \times 10^9/L$, c. Respiratory rate > 24 breaths/minute and heart rate > 90 beats/minute (Ref: Sabiston 19/e p590; Schwartz 10/e p19,138, 9/e p116-117; Bailey 25/e p37-38)



19. Ans. a. Sepsis

20. Ans. d. All of the above

CELLULITIS AND PYOGENIC BACTERIAL INFECTION

21. Ans. a. Broad spectrum antibiotics should be started, c. Immediate debridement + IV antibiotic has main role in treatment, d. Hyperbaric O_2 is useful (Ref: Sabiston 19/e p2011; Bailey 25/e p39-40)

NECROTIZING FASCITIS

- Necrotizing fasciitis is a **rapidly progressive bacterial infection** characterized by involvement and **necrosis of the subcutaneous tissue and fascia**, with typical **sparing of the underlying muscle**^a.
- **MC site of infection: Lower extremities**^a
- May involve trunk, **perineum (Fournier's gangrene)** or head and neck and any other site.

Etiological Agents

- **MC single etiological agents: Group A beta hemolytic streptococci**^a
 - More commonly, **necrotizing fasciitis results from a polymicrobial synergistic infection**^a
- Microorganism responsible: **Group A beta hemolytic streptococci + Staphylococcus, E. coli, Pseudomonas, Proteus, Bacteroides/ Clostridium (Anaerobes)**

Risk Factors for Necrotizing Fasciitis		
<ul style="list-style-type: none"> • Diabetes^a • Pressure sores • Immunocompromised states^a 	<ul style="list-style-type: none"> • Smoking^a • Penetrating trauma^a • Obesity^a • IV drug abuse^a 	<ul style="list-style-type: none"> • Peripheral vascular disease^a • Skin infection / damage^a (abrasions, bites, boils)

Clinical Presentation

- **Pain is the most important presenting symptom**
- **Pain is disproportionately greater**^a than that expected from degree of cellulites present
 - Without treatment **pain may decrease due to thrombosis of small blood vessels and destruction of peripheral nerves** (an ominous sign^a)
- **Skin Features: Edema, erythema**^a (Infected area is red, hot, shiny, swollen and exquisitely tender)
- **Woody hard texture** to subcutaneous tissue
- Inability to distinguish fascial planes and muscle groups on palpation
- **Skin vesicles / cutaneous bullae, soft tissue crepitus** due to **gas production**^a may be seen when necrotizing fasciitis is caused due to mixed flora but not due to group A streptococcus
- **Systemic features: Fever, hypotension, tachycardia, progression to septic shock, DIC or multiple organ failure**^a

Management

- This is a **surgical emergency** and **surgical debridement is mandatory**^Q
 - **Treatment: Urgent surgical debridement + IV fluids + Broad spectrum IV antibiotics + Supportive treatment**^Q
- **Mortality rate** is nearly **100% without surgical debridement**^Q
- **Hyperbaric oxygen** helps in wound healing^Q

22. Ans. c. Localized infection, d. Abscess if any should be managed conservatively (Ref: Sabiston 19/e p1740; Schwartz 10/e p151,483, 9/e p126-127; Bailey 25/e p37)

CELLULITIS

- It is **non-suppurative inflammation**, spreading along the **subcutaneous tissues** and **connective tissue planes** and across intercellular spaces^Q.
- The term is a misnomer, as the **lesion** is one of the **connective** and **interstitial tissue** and not of the cells.
 - **MC causative organism: Streptococcus pyogenes**^Q

Pathology

- The **organism** usually gains access through a wound or scratch or following surgical incision^o.
- There is **wide spread swelling** and **redness** at the area of inflammation, but without definite localization **blebs** and **bullae** form on the skin. **Central necrosis** may occur at **later stage**^o.

Clinical Features

- There is varying degree of **fever** and **toxemia**. **Affected part** is very much **swollen** and **painful**^Q.
- **Diabetic individual** often suffer from cellulitis^Q
- **Examination:** Affected part is warm, swollen and tender, there is **pitting edema** and **brawny induration**. **Surrounding lymph vessels** may be seen as **red streaks** due to lymphangitis^Q.

Treatment

- **Rest and elevation** of the part to reduce edema; Appropriate **antibiotic** preferably broad spectrum^Q
- **Penicillin** is still sensitive against streptococci^Q
 - **Failure** of inflammatory swelling to **subside after 48 to 72 hours** suggests that an **abscess** has developed. In that case **incision** and **drainage** of the pus should be accomplished^Q.

23. Ans. b. Acute thrombophlebitis

24. Ans. c. Streptococci

25. Ans. c. Most commonly site is perineum followed by trunk and extremities

- **MC site of necrotizing fasciitis is extremities^Q** followed by trunk and perineum (Fournier's gangrene).

26. Ans. c. *Strep. pyogenes* (Ref: Bailey 25/e p600)

ERYSIPELAS

- This is a **sharply demarcated streptococcal infection** of the **superficial lymphatic vessels**, usually associated with **broken skin** on the face^o.

Clinical Features

- Affected area is **erythematous** and **edematous**. Patient may be **febrile** and have a **leucocytosis**⁹.

Treatment

- Prompt administration of **broad-spectrum antibiotics** after swabbing the area for **culture and sensitivity** is usually all that is necessary.

27. Ans. b. Contagious and infectious, d. Common in tropics

28. Ans. c. Virulent strains of organism

29. Ans. b. Penicillin

30. Ans. a. Incision and drainage, d. Wide excision (Ref: www.ncbi.nlm.nih.gov)

CARBUNCLE

- A **carbuncle** is an abscess larger than a boil, usually with one or more openings draining pus onto the skin.
- **Most commonly** caused by **Staphylococcus aureus**^Q; MC location: **Nape of the neck**^Q.

Etiology

- Triggers for carbuncle: Folliculitis, friction from clothing or shaving, having the hair pulled out, generally poor hygiene, poor nutrition or weakening of immunity^Q.
- Persons with diabetes^Q and immune system diseases are more likely to develop carbuncles.

Clinical Features

- Carbuncle: Made up of several skin boils, infected mass is filled with fluid, pus and dead tissues.
- It may be red and irritated, grow very fast and have a white or yellow center^Q.

Treatment

- Proper excision by cruciate incision^Q will usually treat the condition effectively
- Surgical incision and drainage of all suppurative collections with antibiotics^Q.

31. Ans. a. Hair follicle (Ref: Schwartz 10/e p474, 9/e p409)

- Folliculitis, carbuncles and furuncles are all types of localized (superficial) skin infections that fall under the category of boils^Q.
- Hair follicles serve as portals for a number of bacteria, although *S. aureus* is the MC cause of localized folliculitis^Q.

32. Ans. a. Infection of skin and subcutaneous tissue, b. Fever and malaise are common, c. Margins are distinct, e. Involved site is red and hot

33. Ans. a. Debridement

34. Ans. d. Caused by streptococcus

GAS GANGRENE

35. Ans. c. *C. perfringens* (Ref: Harrison 18/e p1208; Ananthnarayan 8/e p256)

GAS GANGRENE

- Caused by *C. perfringens* (Gram-positive, anaerobic, spore-bearing bacilli are widely found in soil and feces)^Q.
- This is relevant to military, traumatic surgery and colorectal operations^Q.

Risk Factors

- Immunocompromised, diabetics or patients with malignant disease^Q
- Wounds containing necrotic or foreign material, resulting in anaerobic conditions^Q

Clinical Features

- Severe local wound pain and crepitus (gas in the tissues, which may also be noted on plain radiographs)^Q.
- The wound produces a thin, brown, sweet smelling exudate^Q, in which Gram staining will reveal bacteria.

- Gas and smell are characteristic^Q
- If septicemia occurs, gas may be produced in the other organ, notably the liver known as 'foaming liver'^Q.

- Edema and spreading gangrene follow the release of collagenase, hyaluronidase, other proteases and alpha toxin^Q.
- Early systemic complications with circulatory collapse and multi-organ failure^Q follow if prompt action is not taken

Treatment

- Antibiotic prophylaxis in patients at risk, especially when amputations are performed for peripheral vascular disease with open necrotic ulceration^Q.

- Once a gas gangrene infection is established, large doses of IV penicillin and aggressive debridement of affected tissues are required^Q.
- The use of hyperbaric oxygen is controversial.

- Closure of traumatic wounds or compound fractures should be delayed for 5–6 days^Q until it is certain that these sites are free of infection.

- Passive anti-gas gangrene serum given IM or in emergencies IV^Q used to be common practice in prophylaxis.

36. Ans. a. IV administration of anti-gas gangrene serum, b. Penicillin, d. Surgical debridement

37. Ans. a. Caused by *Clostridium tetani*

38. Ans. b. Gas gangrene, c. Frostbite

39. Ans. b. *Clostridium perfringens* is a gram-negative spore-bearing bacillus

40. Ans. c. Proper wound debridement

41. Ans. a. Ringer lactate
 42. Ans. a. Debridement of wound, b. Systemic penicillin
 43. Ans. c. Gas gangrene
 44. Ans. a. Debridement and antibiotics

TETANUS

45. Ans. a. *Cl. tetani* (Ref: Schwartz 10/e p186,264, 9/e p156, 228; Bailey 25/e p39)

TETANUS

- Caused by *Clostridium tetani* (anaerobic, terminal spore-bearing, Gram-positive bacterium)^Q following implantation into tissues or a wound
- Spores are widespread in soil and manure, and so the infection is more common in traumatic civilian or military wounds.

Clinical Features

- Signs and symptoms of tetanus are mediated by the release of the exotoxin tetanospasmin, which affects myoneural junctions and the motor neurons of the anterior horn of the spinal cord.
- MC initial symptoms: Trismus (lockjaw)^Q, muscle pain and stiffness, back pain, and difficulty swallowing.

- A short prodromal period, which has a poor prognosis, leads to spasms in the distribution of the short motor nerves of the face followed by the development of severe generalised motor spasms including opisthotonus, respiratory arrest and death^Q.
- A longer prodromal period of 4–5 weeks is associated with a milder form of the disease^Q.

- The entry wound may show a localized small area of cellulitis; exudate or aspiration may give a sample that can be stained to show the presence of Gram-positive rods.

- Risus sardonicus (sardonic grin)^Q: Highly characteristic, abnormal, sustained spasm of the facial muscles that appears to produce grinning

Treatment

- Prophylaxis with tetanus toxoid is the best preventative treatment^Q.
- Established infection: Minor debridement of the wound with antibiotic benzylpenicillin^Q
- Relaxants may also be required, and the patient may require ventilation in severe forms, which may be associated with a high mortality.
- Anti-toxin using human immunoglobulin for both at-risk wounds and established infection^Q.

46. Ans. c. Urinary incontinence
 47. Ans. b. First symptom to spasm

TUBERCULOSIS

48. Ans. a. Seen in children and young adults, c. History of contact or drinking infected milk, d. Mostly cervical (Ref: Bailey 25/e p37)

TUBERCULOUS LYMPHADENITIS

- Most commonly affects children or young adults^Q, but can occur at any age.
- Deep upper cervical nodes are most commonly affected^Q, but there may be a widespread cervical lymphadenitis with many matting together.

- In most cases, the tubercular bacilli gain entrance through the tonsil of the corresponding side as the lymphadenopathy.
- Both bovine^Q and human tuberculosis may be responsible.

Pathology

- In approximately 80% of patients, the tuberculous process is limited to the clinically affected group of lymph nodes^Q, but a primary focus in the lungs must always be suspected.
- If treatment is not instituted, the caseated node may liquefy and break down with the formation of a cold abscess^Q in the neck.

- Collar-stud abscess^Q: Pus is initially confined by the deep cervical fascia, but after weeks or months, this may become eroded at one point, pus flows through the small opening into the space beneath the superficial fascia known as 'collar-stud' abscess.

Treatment

- Treatment: ATT
- If an abscess fails to resolve despite ATT: Excision of the abscess and its surrounding fibrous capsule with the relevant lymph nodes^Q.

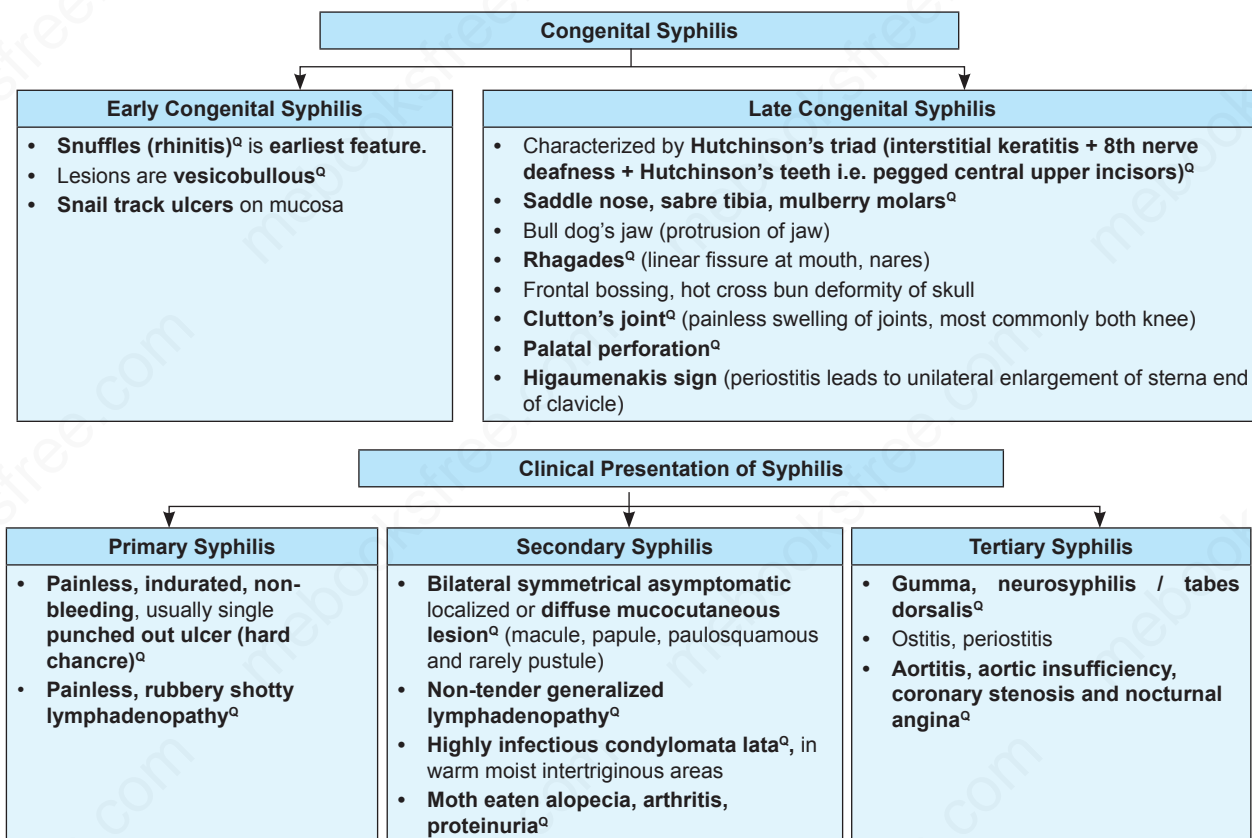
49. Ans. c. Staphylococcal skin infection (Ref: Sabiston 19/e p1831-1832; Schwartz 10/e p1602, 9/e p1414; Bailey 25/e p37)

ACUTE LYMPHADENITIS

- Enlarged tender lymph nodes are usually the result of a bacterial infection (staphylococcal^Q or streptococcal).
- Treatment of the primary cause (e.g., otitis media or pharyngitis) with antibiotics often is all that is necessary.
- Fluctuant nodes: Incision and drainage^Q

SYPHILIS

50. Ans. b. Syphilis (Ref: Rook's 7/e p30.1-30.30, 25.20-39)



51. Ans. a. Syphilis

52. Ans. c. Sexually transmitted (Ref: Harrison 18/e p1390-1391)

YAWS

- Also known as pian, framboesia, or boubia; Caused by *Treponema pertenue*^Q
- Infection is transmitted by direct contact with infectious lesions^Q.

Clinical Features

- Characterized by the development of one or several primary lesions ("mother Yaws") followed by multiple disseminated skin lesions^Q.
- All early skin lesions are infectious and may persist for many months

Treatment

- Treatment is normally by a single intramuscular injection of penicillin^Q, or by a course of penicillin, erythromycin or tetracycline tablets

53. Ans. a. Clutton's joints

54. Ans. d. Erythematous base

55. Ans. d. Dubois abscess (Ref: http://en.wikipedia.org/wiki/Abscess_of_thymus)

DUBOIS ABSCESSSES

- An abscess of the thymus associated with congenital syphilis^Q
- It can present with chest pain behind the sternum.

56. Ans. c. Syphilitic condyloma

LEPROSY

57. Ans. b. Lepromatous (Ref: Rooks 7/e p29.1-29.19)

Type of leprosy	Characteristic feature
Neuritic	• Slit smear negative ^Q
TT	• Single skin lesion ^Q • MC type in India and Africa ^Q
BT	• Satellite lesion ^Q • MC type in South East Asia ^Q
BB>BL	• Inverted saucer lesion ^Q
LL	• Subepidermal free zone ^Q • Globi ^Q are seen • Lucio phenomenon ^Q • Lozarine leprosy reaction ^Q • Leonine facies ^Q

LEPROSY

- MC affected peripheral nerve in leprosy: Ulnar nerve^Q
- Organ not involved in leprosy: Ovary^Q

58. Ans. b. Ovary

59. Ans. c. Lepromatous

60. Ans. a. Ulnar

ACTINOMYCOSIS

61. Ans. c. Penicillin (Ref: Harrison 18/e p1326; Sabiston 19/e p1589)

ACTINOMYCOSIS

- Actinomycosis is a granulomatous suppurative bacterial disease caused by Actinomyces^Q.
- Usually results following tooth extraction, odontogenic infection, or facial trauma^Q.

Clinical Features

- Oral-cervicofacial disease is the MC form^Q, characterized by a painless "lumpy jaw."
- Pelvic actinomycosis is a rare but proven complication of use of intrauterine devices^Q.

Diagnosis

- Accurate diagnosis depends on careful histologic analysis.
- Presence of sulfur granules within purulent specimen is pathognomonic^Q.

Treatment

- Penicillin and sulfonamides^Q are typically effective against these infections.

62. Ans. a. Fascio cervical

63. Ans. d. Actinomycosis

HIV AND COMPLICATIONS

64. Ans. c. Non specific enlargement of lymph node (Ref: Harrison 18/e p466, 1525)

PERSISTENT GENERALIZED LYMPHADENOPATHY (PGL)

- HIV patients develop PGL as an early clinical manifestation of HIV infection^Q.
- PGL is defined as presence of >1 LN in two or three extra-inguinal sites for >3 months without an obvious cause^Q.
- Enlargement is due to follicular hyperplasia^Q.

65. Ans. b. Intact skin
 66. Ans. d. Health care workers
 67. Ans. d. Pre-operative screening of all patients of HIV (Ref: en.wikipedia.org/wiki/Universal_precautions)

UNIVERSAL PRECAUTIONS

- Universal precautions refers to the practice, in medicine, of **avoiding contact with patient's bodily fluids**, by means of the wearing of nonporous articles such as **medical gloves, goggles, and face shields**^Q.
 - Includes **good hygiene habits**, such as **hand washing** and the **use of gloves and other barriers, correct handling of hypodermic needles and scalpels, and aseptic techniques**^Q.
- **Protective clothing include:** Barrier gowns, gloves, eyewear (goggles or glasses) and face shields^Q
- **Typically practiced against:** **Blood, semen, vaginal secretions**^Q, synovial fluid, amniotic fluid, CSF, pleural fluid, peritoneal fluid, pericardial fluid

ANTHRAX

68. Ans. c. Cutaneous type (Ref: [Harrison 18/e p1769-1771](#))

ANTHRAX

- Caused by **Bacillus anthracis**^Q
- Three major clinical forms: **Cutaneous**^Q (MC), gastrointestinal and inhalational

Risk Factors for Necrotizing Fasciitis	
Woolsorters' disease	<ul style="list-style-type: none"> • Occupational hazard for people who sorted wool^Q • Most dangerous form of inhalational anthrax^Q
Hide porter's disease	<ul style="list-style-type: none"> • Caused by contact with contaminated hair, wool, hides or products made from them (Hide-porter's disease)^Q
Malignant pustule	<ul style="list-style-type: none"> • Commonly seen in head and neck^Q • Eschar stage that appears 2-6 days after the hemorrhagic vesicle dries to become a depressed black scab^Q surrounded by redness and extensive edema

69. Ans. d. Anthrax

HAND INFECTIONS

70. Ans. b. Staph. aureus (Ref: [Sabiston 19/e p1977](#); [Bailey 25/e p507](#))

HAND INFECTION

- Infections of hand are most commonly caused by **staphylococcus aureus** in 80% of cases^Q.

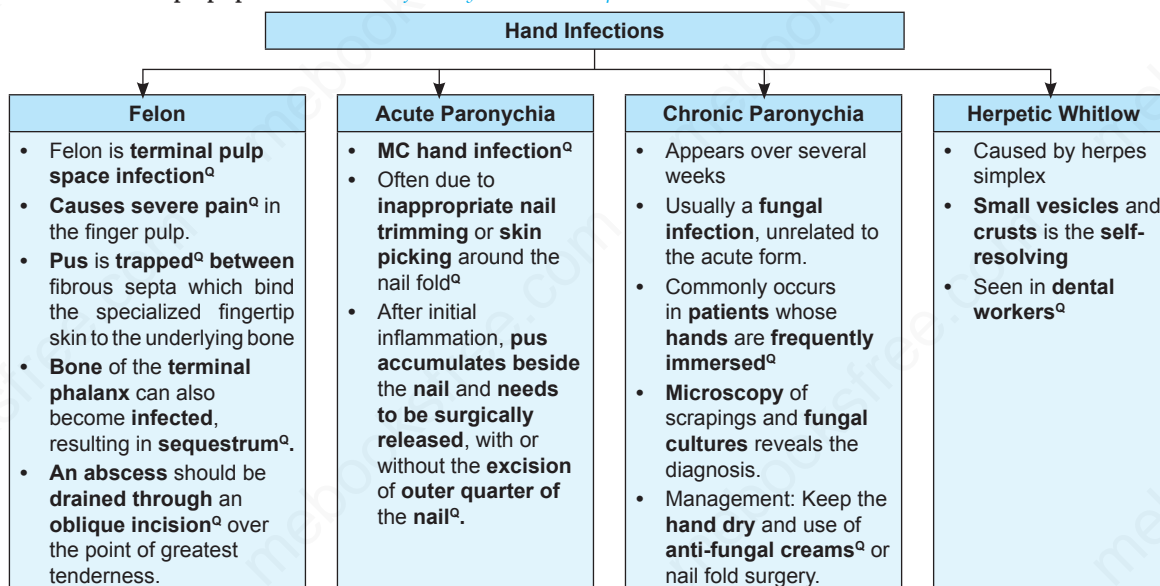
Management

- **Elevation, splinting and antibiotics** if no pus; **Surgical drainage** if **pus** is present^Q
- **Tendon sheath pus** needs **irrigation**^Q
- **Bites** should be **explored**, cleaned and managed with **broad-spectrum antibiotics**^Q
- All infections need **early mobilization** once inflammation settles^Q

71. Ans. a. Thenar space (Ref: [BDC 4/e vol I/129](#); [Keith and Moore 4/e p765](#))

Infection from	Can spread to
Thumb	<ul style="list-style-type: none"> • Thenar space^Q
Index finger	<ul style="list-style-type: none"> • Thenar space^Q
Middle finger	<ul style="list-style-type: none"> • Mid-palmar space^Q
Ring-finger	<ul style="list-style-type: none"> • Mid-palmar space^Q
Little finger	<ul style="list-style-type: none"> • Ulnar bursa and forearm space of parona^Q

72. Ans. b. Terminal pulp space infection (Ref: Bailey and Love 25/e p507)



73. Ans. a. Felon

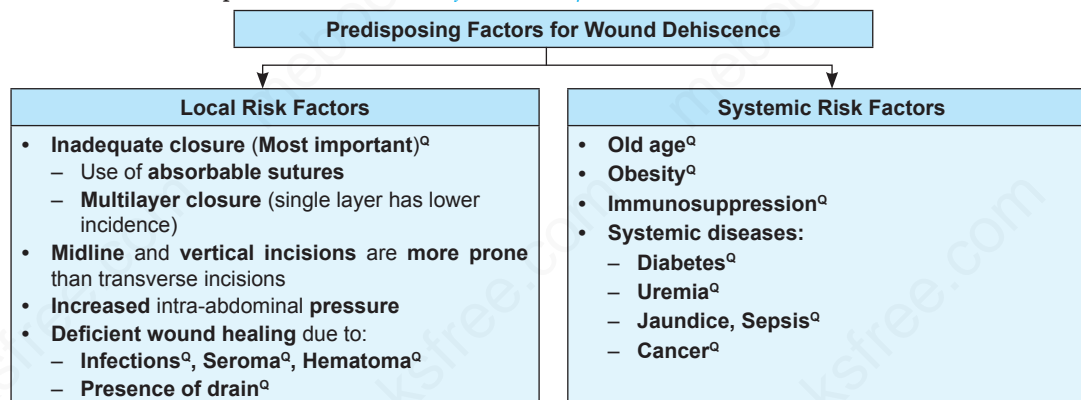
74. Ans. c. Herpetic whitlow

INTRA-ABDOMINAL INFECTIONS

75. Ans. b. Leucopenia

Leucocytosis is seen in subphrenic abscess, not the leucopenia.

76. Ans. a. Drainage coming out through the wound, d. Medial incision is more risk (as compared to transverse incision), e. Transverse incision is better than paramedian incision (Ref: CSDT 11/e p24)



WOUND DEHISCENCE (BURST ABDOMEN)

- Serous or serosanguinous discharge from the wound is the **first sign**^a of dehiscence
 - Most commonly** observed between 5th and 8th post-operative day^a (may occur at any time following wound closure)
 - Wound dehiscence is **partial** or **total disruption** of any or all layers of the operative wound.
 - Extrusion of **abdominal viscera** after rupture of all layers is known as **evisceration**^a.
- Management**
- Wound dehiscence without evisceration: **Prompt elective closure**^a of the wound
 - Wound dehiscence with evisceration:
 - Wound is **covered with moist towels**
 - Under GA, any **exposed bowel** or **omentum** is rinsed with RL containing **antibiotics** and then **returned to abdomen**
 - Previous sutures are removed, wound is reclosed (**Tension suturing**^a)

77. Ans. d. Ribs (Ref: en.wikipedia.org/wiki/Psoas_muscle_abscess)

Causes of Secondary Psoas Abscess	
<ul style="list-style-type: none"> • Crohn's disease • Appendicitis^Q • Ulcerative colitis 	<ul style="list-style-type: none"> • Diverticulitis • Colon cancer • Vertebral osteomyelitis^Q

- A prosthetic infection of hip can give rise to psoas abscess^Q.

78. Ans. b. Vitamin B complex deficiency

79. Ans. d. Serosanguinous discharge

MISCELLANEOUS

80. Ans. a. Microaerophilic streptococci (Ref: *Dorland's Medical Dictionary* 28/e p1770, 1771; *Bailey* 25/e p39)

CHRONIC BURROWING ULCER

- Caused by synergistic infection of Microaerophilic non-hemolytic Streptococci and aerobic hemolytic staphylococci.
- Also known as burrowing phagedenic ulcer, Meleney's ulcer, progressive synergistic gangrene
- Associated with the formation of burrowing cutaneous fissures and sinus tracts that open at distant sites. (Meleney's burrowing ulcers)

81. Ans. a. Lower RTI, c. Clostridium difficile diarrhea, d. UTI (Ref: *Sabiston* 19/e p244-250)

HOSPITAL ACQUIRED INFECTION (HAI)

- Infection that follows surgery or admission to hospital
- Common HAI are:
 - Respiratory infections^Q (including ventilator-associated pneumonia)
 - UTI^Q (mostly related to urinary catheters),
 - Bacteraemia (mostly related to indwelling vascular catheters)
 - Surgical site infections^Q
 - Antibiotic associated diarrhea, caused by Clostridium difficile^Q

- MC nosocomial or hospital acquired infection: Surgical site infections^Q
- MC non-surgical hospital acquired infection: UTI^Q

82. Ans. b. Fungal infection

83. Ans. a. 4

84. Ans. b. Tetanus

85. Ans. c. Rugby (Ref: http://en.wikipedia.org/wiki/Herpes_gladiatorum)

HERPES GLADIATORUM

- Herpes Gladiatorum is one of the most infectious of herpes-caused diseases transmitted by skin-to-skin contact^Q.
- Strongly associated with contact sports, also known as herpes rugbiorum or "scrumpox" (after rugby football), "wrestler's herpes" or "mat pox" (after wrestling)^Q.

86. Ans. a. Tuberculosis, c. LGV (Ref: *Bailey* 25/e p1262)

87. Ans. d. None (Ref: sti.bmj.com/content/51/2/138.full.pdf+html)

SYPHILITIC BALANITIS OF FOLLMANN

- Syphilitic balanitis of Follmann is a very rare manifestation of primary syphilis infection^Q
- Develop after the appearance of the primary chancre

88. Ans. c. Malignant change

89. Ans. b. Fifth post operation day (Ref: *Bailey* 25/e p265)

Causes of Post-operative Fever	
Day	Cause
2–5 days	• Atelectasis of the lung ^Q
3–5 days	• Superficial and deep wound infection ^Q
5 days	• Chest infection including viral respiratory tract infection, UTI and thrombophlebitis ^Q
>5 days	• Wound infection , anastomotic leakage, intracavitary collections and abscesses ^Q

90. Ans. a. Protects vital structure (Ref: lessons4medicos.blogspot.com/.../hiltons-method-to-drain-abscesses/.)

HILTON'S METHOD OF ABSCESS DRAINAGE

- During drainage of abscess situated in important areas like axilla or groin^Q, there is chance of injury to underlying major vessels and nerves^Q if adequate care is not taken.
- In drainage of abscess in such locations, the skin and subcutaneous tissue are incised with a knife.
- Deep fascia is not incised by sharp knife but pierced by thrusting a sinus forceps through the deep fascia and the sinus forceps is then opened up to enlarge the opening in the deep fascia for easy drainage of pus^Q.
- Hilton's method protects underlying important vessels and nerves^Q.

91. Ans. b. Axillary abscess

92. Ans. b. Complete resection (Ref: www.ncbi.nlm.nih.gov/pubmed/22019686)

ANTIBIOMA

- Antibiotic induced swelling
- When an abscess occur in the breast and antibiotic was given, without even draining the abscess, the abscess cavity next will become fibrous and it result in firm to large lump in the breast.
- Antibiotoma can be confused for malignancy, excision is done

93. Ans. a. No antibiotics required in clean surgery, c. Spillage of stomach content converts a clean/contaminated case to a contaminated case, d. In clean/contaminated wounds infection rate is 10% (Ref: Sabiston 19/e p251-252; Schwartz 9/e p119, 222)

- Prophylactic systemic antibiotics are not indicated for patients undergoing low-risk straightforward clean surgical operations in which no obvious bacterial contamination or insertion of a foreign body has occurred^Q.
- SSI risk has traditionally been correlated to wound class. The accepted range of infection rates has been 1-5 % for clean, 3-11% for clean contaminated^Q, and >27% for dirty wounds
- Contaminated wounds: Open accidental wounds encountered early after injury, those with extensive introduction of bacteria into a normally sterile area of the body due to major breaks in sterile technique (e.g. open cardiac massage), gross spillage of viscus contents such as from the intestine, or incision through inflamed, albeit nonpurulent tissue^Q.
- Hernia repair is clean wound^Q.

94. Ans. d. All of the above

95. Ans. b. To prevent injury to vital structure

Fluid, Electrolyte and Nutrition

MULTIPLE CHOICE QUESTIONS

ENTERAL NUTRITION

- The length of the feeding tube to be inserted for transpyloric feeding is measured from the tip of: (AIIMS Nov 2002)
 - Nose to the umbilicus
 - Ear lobe to the umbilicus
 - Nose to the knee joint
 - Ear lobe to the knee joint
- Ramesh met an accident with a car and has been in 'deep coma' for the last 15 days. The most suitable route for the administration of protein and calories is by: (All India 2002)
 - Jejunostomy tube feeding
 - Gastrostomy tube feeding
 - Nasogastric tube feeding
 - Central venous hyperalimentation
- Contraindications of enteral nutrition: (PGI Dec 2006)
 - Intestinal obstruction
 - Severe pancreatitis
 - Severe diarrhea
 - IBD
 - Intestinal fistula
- A patient undergoes a prolonged and complicated pancreatic surgery for chronic pancreatitis. Most preferred route for supplementary nutrition in this patient would be: (All India 2008)
 - Total parenteral nutrition
 - Feeding gastrostomy
 - Feeding jejunostomy
 - Oral feeding
- Recognized frequent complications of enteral feeding: (PGI June 2005)
 - Constipation
 - Diarrhea
 - Aspiration pneumonia
 - Hypoglycemia
 - Hypernatremia
- Not a contraindication of enteral nutrition: (Punjab 2009)
 - Severe diarrhea
 - Severe pancreatitis
 - IBD
 - Intestinal fistula
- In percutaneous endoscopic gastrostomy (PEG), which of the following is not used? (MHSSMCET 2008)
 - Push technique
 - Pull technique
 - Retraction method
 - Introducer technique

TOTAL PARENTERAL NUTRITION

- Parenteral nutrition is not used in: (PGI June 2008)
 - Enterocutaneous fistula
 - Burns
 - Crohn's disease
 - Paralytic ileus
 - Pancreatitis

- A patient on TPN develops deficiency of: (PGI Dec 2006)
 - Folic acid
 - Iron
 - Vitamin B12
 - Copper
 - Fatty acids
- Which of the following nutrients are not included in TPN? (All India 2011)
 - Lipids
 - Carbohydrates
 - Proteins
 - Fibers
- Side-effect(s) of parenteral nutrition is/are: (PGI Nov 2011)
 - Hypoglycemia
 - Hyperglycemia
 - Hypercalcemia
 - Hypercapnia
 - Hypophosphatemia
- Best vein for total parenteral nutrition is: (MHPGMCET 2002)
 - Subclavian vein
 - Femoral vein
 - Brachial vein
 - Saphenous vein
- One is not indication of total parenteral nutrition: (AIIMS Nov 95)
 - Acute pancreatitis
 - Enterocolic fistula
 - Chronic liver disease
 - Fecal fistula
- TPN is indicated in all except: (PGI Dec 2005)
 - Short bowel syndrome
 - Burn
 - Sepsis
 - Enterocutaneous fistula
- Best vein for total parenteral nutrition is:
 - Subclavian vein
 - Femoral vein
 - Brachial vein
 - Saphenous vein
- True about TPN: (PGI June 2008)
 - Carbohydrate forms about 40% of energy source
 - In abdominal injury early parenteral nutrition should be started
 - Proteins forms 60% of energy source
 - Lipids form 20% of energy source
- Which of the following is not a complication of TPN: (JIPMER 2014, 2013)
 - Hyperammonemia
 - Hypercholesterolemia
 - Neutrophil dysfunction
 - Hyperphosphatemia

- Which of the following is not a complication of Total Parenteral Nutrition? (AIIMS Nov 2008)
 - Metabolic bone disease
 - Essential fatty acid deficiency
 - Congestive cardiac failure
 - Hypophosphatemia

19. **Most common complication of parenteral nutrition includes all except:** (MCI Sept 2009)
 a. Hyperglycemia b. Hyperkalemia
 c. Hyperosmolar dehydration d. Azotemia
20. **Which of the following is preferred for cannulation in TPN?** (MCI Sept 2009)
 a. Subclavian vein
 b. Great saphenous vein
 c. Median cubital vein
 d. External jugular vein
21. **Which is best method for supplementing nutrition in patients who have undergone massive resection of the small intestine is?** (MCI Sept 2009)
 a. Parenteral b. Enteral
 c. Gastrostomy d. All of the above
22. **All of the following are complications in a patient on total parenteral nutrition except:** (MCI Sept 2008)
 a. Hypercholesterolemia b. Hyperglycemia
 c. Hypotriglyceridemia d. Hypophosphatemia
23. **Which of the following is the most common complication of TPN?** (AIIMS 95)
 a. Catheter related complications
 b. Acidosis
 c. Acaculous cholecystitis
 d. Hypokalemia
24. **A patient on total parenteral nutrition for 20 days presents with weakness, vertigo and convulsions. Diagnosis is:** (All India 2000)
 a. Hypomagnesemia b. Hyperammonemia
 c. Hypercalcemia d. Hyperkalemia
25. **In IV hyperalimentation, we give:** (PGI June 2002)
 a. Hypertonic saline b. Fats
 c. Amino acids d. Dextrose
 e. LMW dextran
26. **Complication of TPN include:** (AIIMS 87)
 a. Hyperglycemia
 b. Hyperkalemia
 c. Hyperosmolar dehydration
 d. Azotemia
 e. All of the above
27. **Albumin infusion for parenteral use is restricted because:** (AIIMS 84)
 a. It is costly
 b. Carcinogenic
 c. Does not raise oncotic pressure
 d. All of the above
28. **Following TPN, one expects weight gain after:** (AIIMS 84)
 a. 2 days b. 7 days
 c. 4 weeks d. 6 weeks
29. **The minimum amount of proteins needed for positive nitrogen balance is:** (PGI 85)
 a. 20-30 gm/day b. 35-40 gm/day
 c. 50 gm/day d. 60 gm/day
30. **Deficiency of following elements is seen with hyperalimentation except:** (JIPMER 93)
 a. Calcium b. Phosphates
 c. Zinc d. Magnesium
31. **Following TPN, weight loss is seen:** (Orissa 99)
 a. Up to 7 days b. 7-10th day
 c. 10-15th day d. 15th day onwards
32. **TPN may be complicated by:** (AIIMS 80, 81)
 a. Obstructive jaundice b. Hyperosteosis
 c. Hypercalcemia d. Pancreatitis
33. **Complication of total parenteral nutrition is:** (Recent Questions 2013)
 a. CHF
 b. Hypochloremia
 c. Metabolic acidosis
 d. Leukopenia

ELECTROLYTE ABNORMALITIES

34. **Chronic vomiting leads to all except:** (PGI Nov 2011)
 a. Hyponatremia b. Hypochloremia
 c. Metabolic alkalosis d. Metabolic acidosis
 e. Hypokalemia
35. **Hypokalemia with alkalosis is found in:** (Orissa 2011)
 a. Diarrhea
 b. Vomiting
 c. Ureterosigmoidostomy
 d. Villous adenoma of rectum
36. **Condition which does not cause metabolic acidosis:** (AIIMS 84)
 a. Renal failure
 b. Ureterosigmoidostomy
 c. Pancreatic or biliary fistula
 d. Pyloric stenosis
37. **Following fistulous conditions give rise to maximum fluid and electrolyte imbalance:** (AIIMS 85)
 a. Distal ileal b. Gastric
 c. Duodenal d. Sigmoid
38. **Highest concentration of potassium is seen in:** (AIIMS 92)
 a. Jejunum b. Ileum
 c. Duodenum d. Colon
39. **Most common cause of metabolic alkalosis is:** (Karnataka 94)
 a. Cancer stomach b. Pyloric stenosis
 c. Small-bowel obstruction d. Diuretics
40. **Hyponatremia in multiple myeloma is:** (Kerala 95)
 a. True b. Relative
 c. Absolute d. Pseudo
41. **All of the following are seen in persisting vomiting except:** (AIIMS Nov 99)
 a. Hypokalemia
 b. Decreased K⁺ in urine
 c. Elevated pH of blood
 d. Metabolic alkalosis
42. **After ureterosigmoidostomy which electrolyte abnormality may occur:** (AIIMS June 99)
 a. Hyperchloremic acidosis b. Metabolic alkalosis
 c. Metabolic acidosis d. Hypochloremic acidosis
43. **In post burn patient, true is:** (AIIMS June 94)
 a. Hypokalemic alkalosis b. Hyperkalemic alkalosis
 c. Hyperkalemic acidosis d. Hypokalemic acidosis
44. **Which of the following is not an important cause of hyponatremia?** (All India 2004)
 a. Gastric fistula
 b. Excessive vomiting
 c. Excessive sweating
 d. Prolonged Ryle's tube aspiration
45. **Metabolic changes associated with excessive vomiting includes the following:** (All India 99)
 a. Metabolic acidosis b. Hyperchloremia
 c. Hypokalemia d. Decreases bicarbonates

IV FLUIDS

46. The highest concentration of potassium is in: (AIIMS 85)
 a. Plasma b. Isotonic saline
 c. Ringer lactate d. Darrow's solution
47. Pitting edema indicates an excess of ___ litres of fluid in tissue spaces: (PGI 88)
 a. 2.5 b. 3.5
 c. 4.5 d. 5.5
48. In patients depending entirely on parenteral fluids, there is weight loss of daily: (PGI 88)
 a. 50 gm b. 150 gm
 c. 200 gm d. 250 gm
49. 20 mEq (mmol) of potassium chloride in 500 ml of 5% dextrose solution is given intravenously to treat: (PGI 81, AIIMS 84)
 a. Metabolic alkalosis
 b. Respiratory alkalosis
 c. Metabolic acidosis
 d. Respiratory acidosis
50. Haemacel contains: (PGI 81, AIIMS 84)
 a. Albumin b. Degraded gelatin
 c. Calcium d. Sodium
51. In the immediate post operative period, body potassium is:
 a. Exchanged with calcium (JIPMER 86, AMU 86)
 b. Exchanged with magnesium
 c. Retained in body
 d. Excreted excessively
52. Low molecular weight dextran is contra indicated in:
 a. Focal distress syndrome (AIIMS 81, PGI 81)
 b. Cerebrovascular accident
 c. Electrical burns
 d. Thrombocytopenia
53. C.V.P (Central Venous Pressure) and pulmonary wedge pressure give an accurate assessment of all the following except: (UPSC 95)
 a. Tissue perfusion b. Volume depletion
 c. Volume overload d. Myocardial function
54. 10% dextrose is: (DNB 2005)
 a. Isotonic b. Hypotonic
 c. Hypertonic d. None
55. In a patient with multisystem trauma, the presence of hypotension along with elevated central venous pressure is suggestive of: (UPSC 97)
 a. Upper airway obstruction
 b. Major abdominal bleed
 c. Cardiopulmonary problem
 d. Spinal cord injury
56. Which of the following is the best method to assess the adequacy of replacement? (AIIMS 2000)
 a. Decrease in thirst b. Increase in urine output
 c. Blood pressure d. Increased PaO₂
57. In a person who has fasted for 5 days all are seen except: (AIIMS 98)
 a. GH levels decreased
 b. Glucose tolerance decreased
 c. Immunoreactive insulin decreased
 d. Free fatty acids (Plasma) increased
58. Content of Na⁺ in ringer lactate is mEq/L: (TN 99)
 a. 154 b. 12
 c. 130 d. 144
59. Fructose is not used in IV infusion as it cause: (AIIMS 89)
 a. Irritability
 b. Mental retardation

- c. Increased erythrocyte protoporphyrin
 d. Increased urinary coproporphyrin

60. Sodium content of one liter of isotonic saline is (DNB 2011, PGI 88)

- a. 140 mEq b. 154 mEq
 c. 40 mEq d. 70 mEq

61. A postoperative patient with pH 7.25, MAP (mean arterial pressure) 60 mm Hg treated with: (PGI 2003)

- a. IV sodium bicarbonate
 b. Only normal saline
 c. Fluid therapy with CVP monitoring
 d. Fluid restriction

62. Most common cause of water intoxication in surgical patient is due to: (COMEDK 2005)

- a. Colorectal wash with plain water
 b. Syndrome of inappropriate secretion of ADH
 c. Irrigation during transurethral resection of prostate
 d. Excessive infusion of 5% glucose

63. A young man weighing 65 kg was admitted to the hospital with severe burns in a severe catabolic state. An individual in this state requires 40 kcal per kg body weight per day 1 gm of protein/kg body weight/day. This young man was given a solution containing 20% glucose and 4.25% protein. If 3000 ml of solution is infused per day: (AIIMS Nov 2003)

- a. The patient would not be getting sufficient protein
 b. The calories supplied would be inadequate
 c. Both protein and calories would be adequate
 d. Too much protein is being infused

64. After 30% loss of blood volume in road traffic accident. What is the next management?

- a. IV fluids only
 b. IV fluids with cardiac stimulant
 c. Dopamine
 d. Vasopressor drug

65. Which among the following is best method to assess intake of fluid in polytrauma patient? (PGI June 2006, AIIMS Nov 95, AIIMS Nov 94)

- a. Urine output b. CVP
 c. Pulse d. BP

66. Which of the following is hypertonic? (DNB 2009)

- a. 5% dextrose b. 0.45% normal saline
 c. 0.9% normal saline d. 3% normal saline

67. All electrolyte abnormalities are seen in immediate postoperative period, except: (AIIMS Nov 94)

- a. Negative Nitrogen balance b. Hypokalemia
 c. Glucose intolerance d. Hyponatremia

68. Blood loss during major surgery is best estimated by:

- a. Visual assessment (PGI June 99)
 b. Suction bottles
 c. Transesophageal USG Doppler
 d. Cardiac output by thermodilution

69. Concentration of sodium in RL is: (Recent Questions 2013)

- a. 154 b. 120
 c. 130 d. 144

MISCELLANEOUS

70. The disadvantage of elemental diets in children include:

(AIIMS 81, PGI 86)

- a. Hypertonic dehydration b. Lower caloric input
 c. Dumping syndrome d. High nitrogen input

71. During nutritional assessment of a surgical patient, the status of muscle protein is indicated by which one of the following parameters: (UPSC 95)
- Serum albumin
 - Triceps skinfold thickness
 - Mid-arm circumference
 - Hb level
72. Cortisol level returns to normal ____ after hemorrhage: (Orissa 98)
- 2 weeks
 - 10 days
 - 7 days
 - 3 days
73. Body water content in percentage of body weight is lowest in: (Orissa 98)
- Well-built man
 - Fat woman
 - Well nourished child
 - Fat man
74. Water content in infant:
- 60-70%
 - 75-80%
 - 80-90%
 - >90%
75. Insensible daily water loss is: (PGI 88)
- 500-600 ml
 - 800-1000 ml
 - 1000-1500 ml
 - 2000 ml
76. Critical pH in Mendelson syndrome: (Orissa 2004)
- 2.5
 - 3.0
 - 3.5
 - 4.0
77. The ideal colloidal solution is: (MHSSMCET 2005, MHPGMCET 2006)
- Dextran
 - Plasma
 - Albumin
 - Hydroxyethyl starch
78. Skin fold thickness (for assessment of nutritional status) can be measured at all the following except: (MHSSMCET 2006)
- Biceps
 - Triceps
 - Suprailiac region
 - None
79. In surgical patient malnutrition is best assessed by: (Recent Questions 2013)
- Serum albumin
 - Hb level
 - Mid arm circumference
 - Triceps skin fold thickness

EXPLANATIONS

ENTERAL NUTRITION

1. Ans. b. Ear lobe to the umbilicus (Ref: en.wikipedia.org/wiki/Feeding_tube)

- Feeding tube length is measured by following the normal route for the tube (Nasal ala → To ear lobe → To epigastrium)^Q
- The distance between the nasal ala and ear lobe is almost equal to the distance between the epigastrium and umbilicus, the length can be measured from ear lobe to umbilicus^Q.

2. Ans. a. Jejunostomy tube feeding (Ref: *Sabiston 19/e p132-136; Bailey 26/e p266-270, 25/e p229-231*)

Unless the GI tract is nonfunctional, its use for nutritional support is preferable as compared to TPN. In a patient who is comatose either NG feeding or feeding through a gastrostomy tube may lead to vomiting and aspiration. This can be avoided by using a nasoenteric tube with the tip placed in jejunum under fluoroscopic guidance or endoscopic control. Alternatively, a catheter may be placed directly into the proximal jejunum through a small upper abdominal incision.

ENTERAL NUTRITION

- Enteral feeding means delivery of nutrients into the GIT^Q.
- The alimentary tract should be used whenever possible^Q.
- This can be achieved with oral supplements (sip feeding) or with a variety of tube-feeding techniques delivering food into the stomach, duodenum or jejunum^Q.

Advantages of Enteral route over Parenteral Route

- Maintains integrity of gastrointestinal tract^Q
- Reduces translocation of gut bacteria^Q that may lead to infection.
- Reduces the levels of pro inflammatory cytokines^Q generated by the gut that contribute to hypermetabolism.

Enteral Nutrition

Indications	Contraindications
<ul style="list-style-type: none"> • Protein-energy malnutrition with inadequate oral intake^Q • Dysphagia except for fluids^Q • Major trauma (or surgery^Q) when return to required dietary intake is prolonged • Inflammatory bowel disease^Q • Distal, low-output (<200 ml/day) enterocutaneous fistula^Q • To enhance adaptation after massive enterectomy 	<ul style="list-style-type: none"> • Small bowel obstruction or ileus^Q • Severe diarrhea^Q • Proximal small intestinal fistula^Q • Severe pancreatitis^Q

3. Ans. a. Intestinal obstruction, b. Severe pancreatitis, c. Severe diarrhea, e. Intestinal fistula

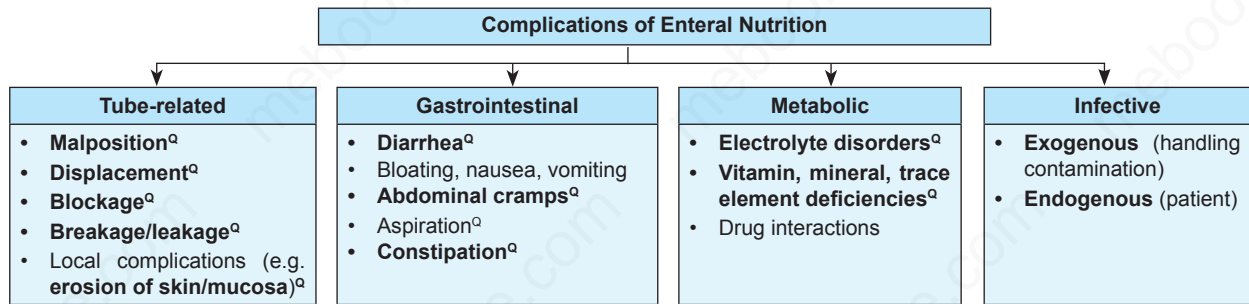
4. Ans. c. Feeding jejunostomy (Ref: *Essentials of General Surgery by Lawrence 4/e p80*)

- A feeding jejunostomy is the preferred procedure to provide supplementary nutrition in this patient as it provides protection to the pancreatic anastomosis and cause minimal stimulation of pancreatic secretion thereby giving rest to the pancreas^Q.
- After pancreatic surgery, TPN should or only be used when there is intolerance to enteral nutrition or enteral nutrition is contraindicated^Q.
- Pancreatic surgery does not usually interfere with the function of the gastrointestinal tract and enteral route remains the preferred mode for providing nutrition.

Operations where Early Oral Feeding is not Recommended

- | | |
|--|---|
| <ul style="list-style-type: none"> • Major surgery involving upper GI tract: <ul style="list-style-type: none"> – Esophageal resection^Q – Gastric resection^Q | <ul style="list-style-type: none"> • Major Hepatic Surgery^Q • Major Pancreatic Surgery^Q |
|--|---|

5. Ans. a. Constipation, b. Diarrhea, c. Aspiration pneumonia (Ref: Sabiston 19/e p135; Bailey 26/e p269, 25/e p231)



6. Ans. c. IBD

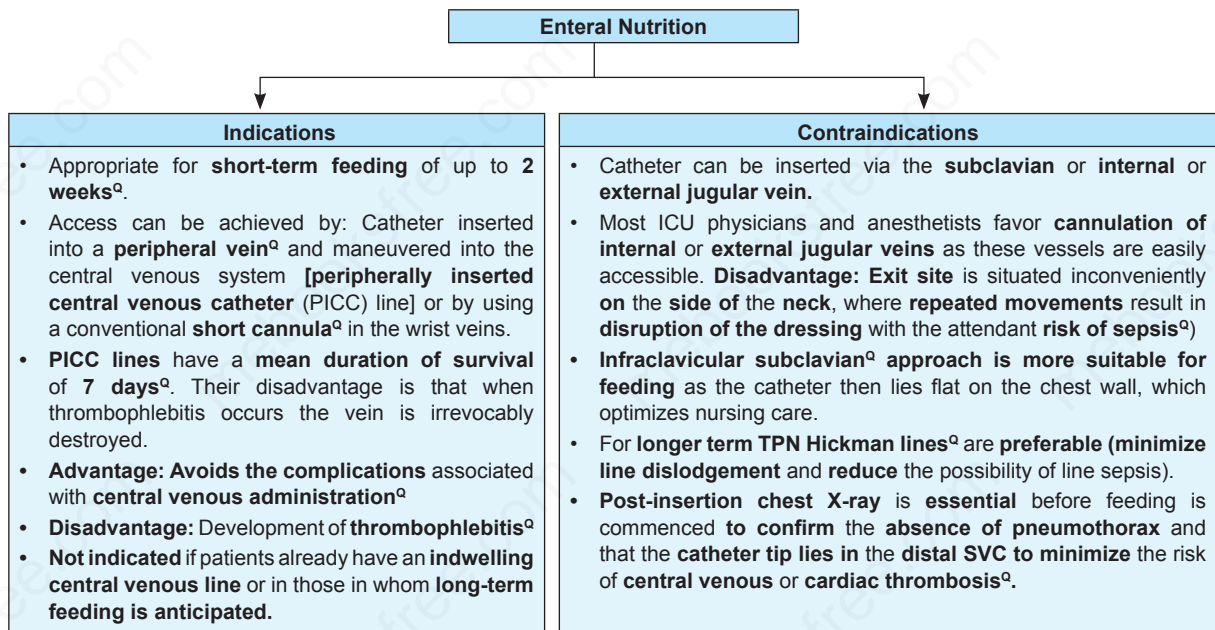
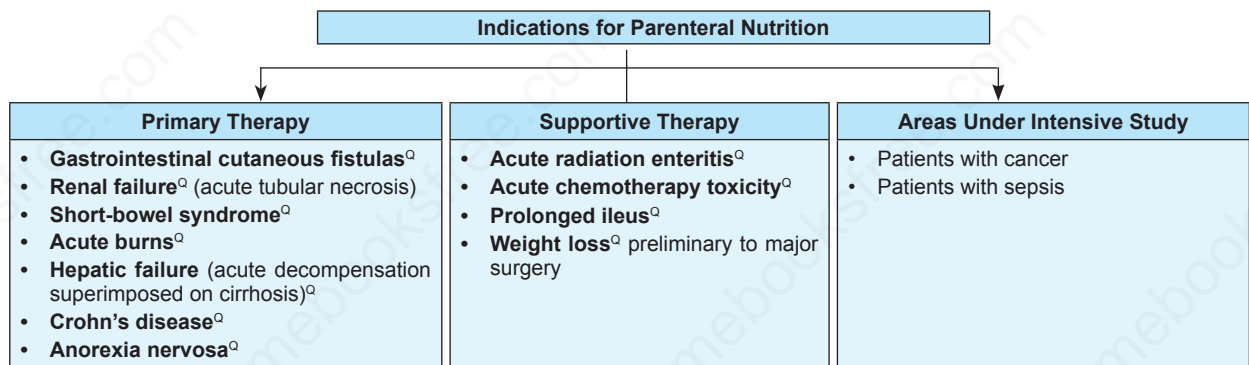
7. Ans. c. Retraction method (Ref: Sabiston 19/e p135)

METHODS USED FOR PERCUTANEOUS ENDOSCOPIC GASTROSTOMY (PEG)

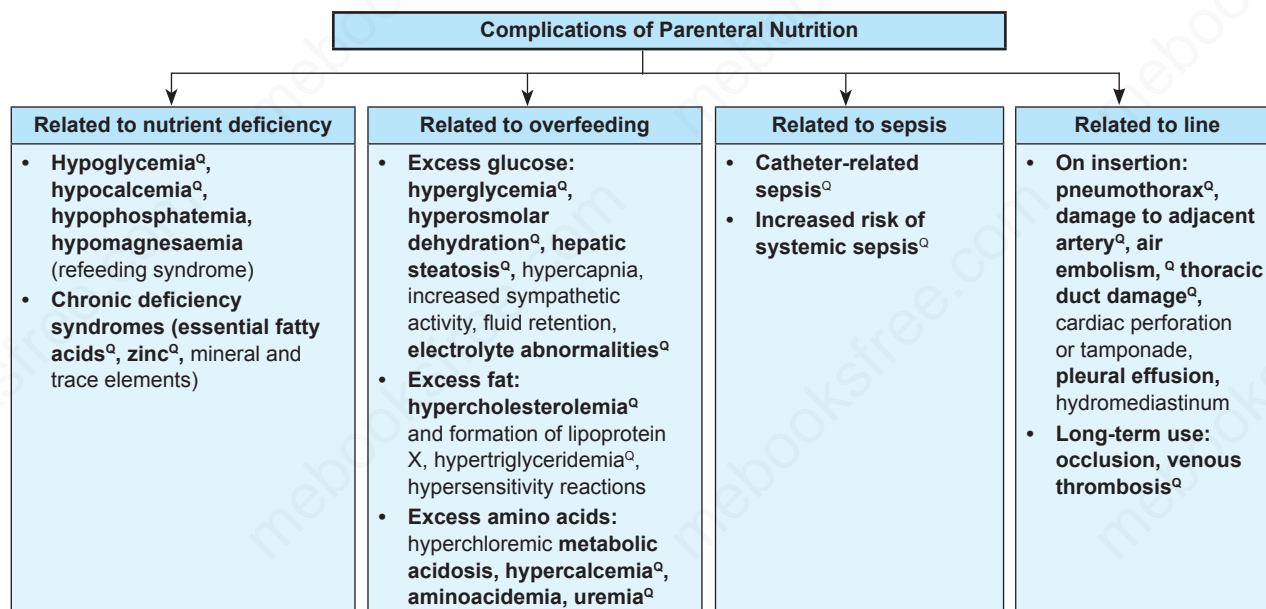
- Push technique^Q
- Pull technique^Q
- Introducer technique^Q

TOTAL PARENTERAL NUTRITION

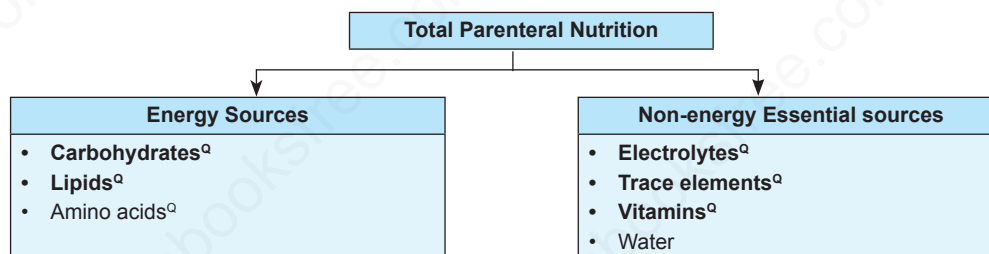
8. Ans. e. Pancreatitis (Ref: Sabiston 19/e p137-141; Bailey 26/e p268-270, 25/e p231-233)



9. Ans. a. Folic acid, b. Iron, c. Vitamin B12, d. Copper, e. Fatty acids (Ref: Sabiston 19/e p140; Bailey 26/e p270, 25/e p233)



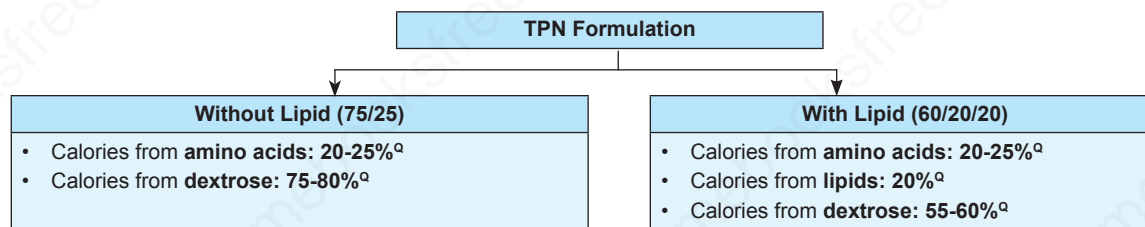
10. Ans. d. Fibers (Ref: Bailey 26/e p264, 25/e p231)



11. Ans. a. Hypoglycemia, b. Hyperglycemia, c. Hypercalcemia, d. Hypercapnia, e. Hypophosphatemia
 12. Ans. a. Subclavian vein (Ref: Sabiston 19/e p137-138; Bailey 25/e p232)

- Preferred site for central vein infusion: SVC^Q
- Preferred access site for TPN: Subclavian^Q > Jugular > Femoral vein

13. Ans. c. Chronic liver disease 14. Ans. c. Sepsis 15. Ans. a. Subclavian vein
 16. Ans. d. Lipids form 20% of energy source (Ref: Sabiston 19/e p138)

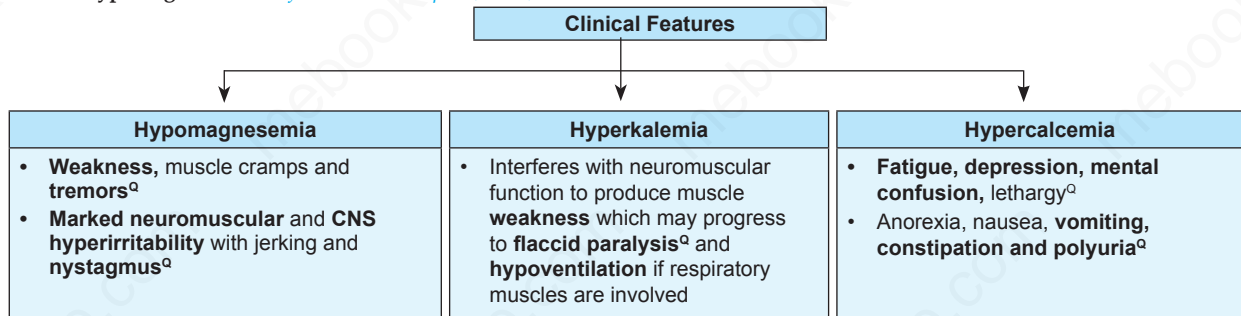


17. Ans. d. Hyperphosphatemia 18. Ans. c. Congestive cardiac failure
 19. Ans. None (Ref: CSDT 12/e p161)

Electrolyte Abnormalities in TPN	
<ul style="list-style-type: none"> Hyponatremia and hypernatremia^Q Hypokalemia and Hyperkalemia^Q Hypophosphatemia and hyperphosphatemia^Q Hypomagnesemia and Hypermagnesemia^Q 	<ul style="list-style-type: none"> Hypocalcemia and hypercalcemia^Q High zinc and low zinc^Q High copper and low copper^Q Hyperchloremic metabolic acidosis^Q

20. Ans. a. Subclavian vein 21. Ans. a. Parenteral 22. Ans. c. Hypotriglyceridemia
 23. Ans. None

24. Ans. a. Hypomagnesemia (Ref: Harrison 18/e p357, 3090, 3099)



25. Ans. b. Fats, c. Amino acids, d. Dextrose

27. Ans. a. It is costly

29. Ans. d. 60 gm/day

31. Ans. a. Up to 7 days

26. Ans. e. All of the above

28. Ans. b. 7 days

30. Ans. None

32. Ans. c. Hypercalcemia

REFEEDING SYNDROME

- Characterized by severe fluid and electrolyte shifts in malnourished patients undergoing refeeding.
- It can occur with either enteral or parenteral nutrition but is more common with the latter.
- It results in hypophosphataemia, hypocalcaemia and hypomagnesaemia^Q.
- Risk Factors: Alcohol dependency, severe malnutrition, Anorexics and prolonged periods of fasting^Q.

Treatment

- Treatment involves matching intakes with requirements and assiduously avoiding overfeeding^Q.
- Calorie delivery should be increased slowly and vitamins administered regularly.
- Hypophosphataemia and hypomagnesaemia require treatment^Q.

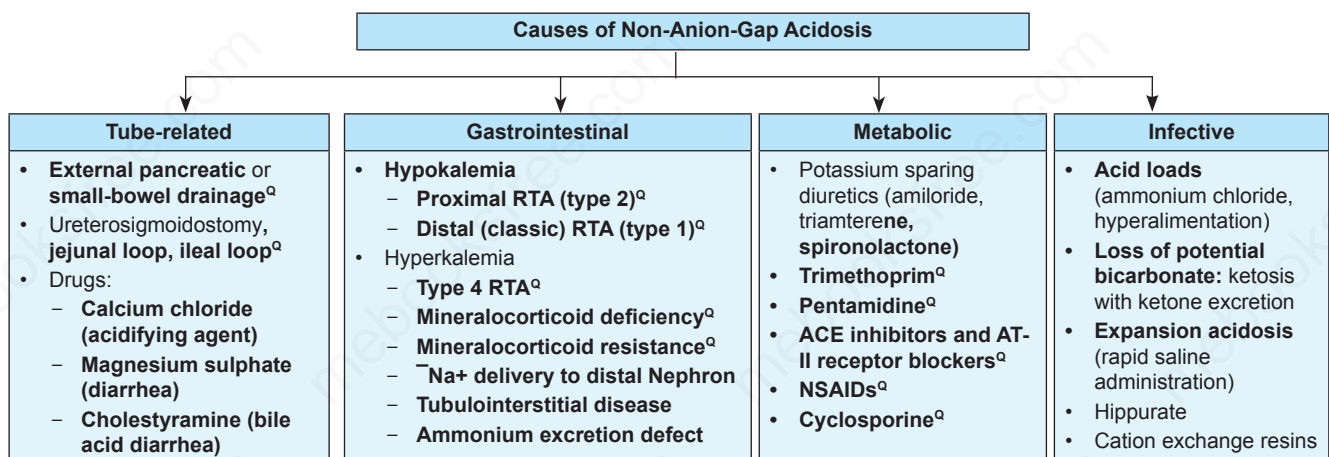
33. Ans. c. Metabolic acidosis

ELECTROLYTE ABNORMALITIES

34. Ans. d. Metabolic acidosis (Ref: Sabiston 19/e p1196; Schwartz 10/e p73-75, 1599, 9/e p921; Bailey 25/e p1065)

- Chronic vomiting leads to Hypochloremic, hypokalemic, metabolic alkalosis.

35. Ans. b. Vomiting (Ref: Harrison 18/e p368)



CAUSES OF HIGH ANION-GAP METABOLIC ACIDOSIS

- Lactic acidosis^Q
- Ketoacidosis^Q (Diabetic, Alcoholic, Starvation)
- Toxins (Ethylene glycol, Methanol, Salicylates, Propylene glycol, Pyroglutamic acid)^Q
- Renal failure^Q (acute and chronic)

36. Ans. d. Pyloric stenosis

37. Ans. c. Duodenal (Ref: Sabiston 19/e p1271)

ENTEROCUTANEOUS FISTULAS

- Enterocutaneous fistulas are classified according to their location and volume of daily output.
- These factors dictate both treatment and morbidity and mortality rates^Q.
- In general, the more proximal the fistula in the 'intestine' (but not the stomach), the more serious the problem, with greater fluid and electrolyte loss^Q.

- Maximum fluid and electrolyte imbalance occur in duodenal fistulas^Q.

38. Ans. d. Colon (Ref: Schwartz 10/e p69, 9/e p54; Bailey 25/e p227)

- Maximum K⁺ concentration: Colon^Q (30 mEq/L) > Saliva (25 mEq/L)

Composition of GI Secretions					
Type of Secretion	Volume (mL/day)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)	HCO ₃ ⁻ (mEq/L)
Stomach	1000–2000 ^Q	60–90	10–30	100–130 ^Q	0
Small intestine	2000–3000 ^Q	120–140	5–10	90–120	30–40
Colon	—	60	30 ^Q	40	0
Pancreas	600–800 ^Q	135–145 ^Q	5–10	70–90	95–115 ^Q
Bile	300–800 ^Q	135–145 ^Q	5–10	90–110	30–40

39. Ans. b. Pyloric stenosis

40. Ans. d. Pseudo (Ref: Harrison 18/e p347)

PSEUDOHYPONATREMIA

- Patients with multiple myeloma also have a decreased anion gap [i.e., $\text{Na}^+ - (\text{Cl}^- + \text{HCO}_3^-)$] because the M component is cationic, resulting in retention of chloride^Q.
- This is often accompanied by hyponatremia that is felt to be artificial (Pseudohyponatremia) because each volume of serum has less water as a result of the increased protein^Q.

41. Ans. b. Decreased K⁺ in urine

42. Ans. a. Hyperchloremic acidosis

43. Ans. c. Hyperkalemic acidosis

44. Ans. c. Excessive sweating

45. Ans. c. Hypokalemia

IV FLUIDS

46. Ans. d. Darrow's solution (Ref: Bailey 25/e p226; www.idruginfo.com/?cat=drug...Darrow's%20Solution)

Composition of crystalloid and colloid solutions (mM/L)						
Solution	Na ⁺	K ⁺	Ca ²⁺	Cl ⁻	Lactate	Colloid
Hartmann's (RL)	130	4	< 2.7	109	28	
Normal saline (0.9% NaCl)	154			154		
Dextrose saline (4% dextrose in 0.18% saline)	30			30		
Gelofusine	150		< 1	150		Gelatin 4%
Hemacel	145	5.1	< 6.26	145		Polygelin 75 g/L
Hetastarch						Hydroxyethyl starch 6%
Lactated potassium saline injection (Darrow's solution)	121	35		103	53	

47. Ans. c. 4.5

48. Ans. b. 150 g

49. Ans. a. Metabolic alkalosis

50. Ans. b. Degraded gelatin

51. Ans. d. Excreted excessively

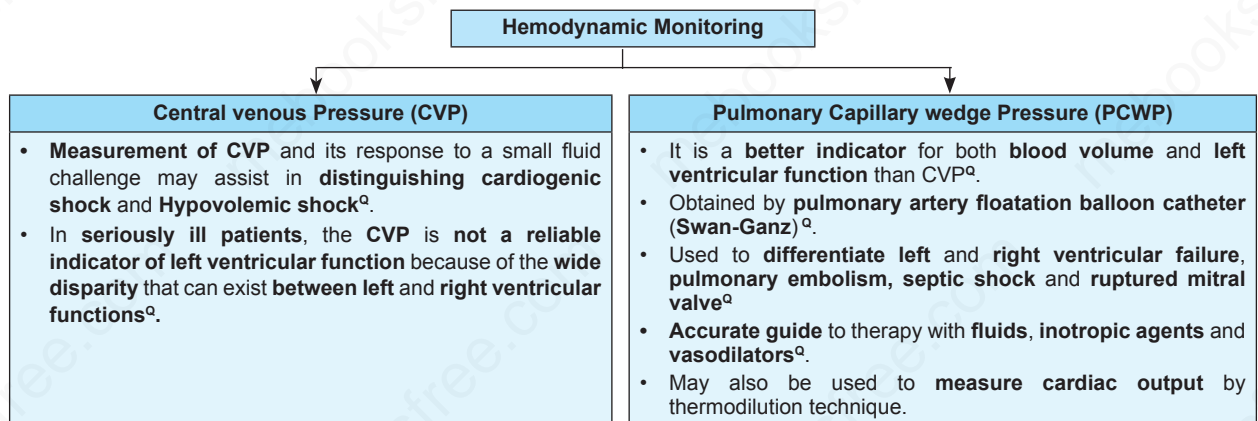
- In immediate post-operative period due to increased adrenocortical activity, there is Na⁺ retention and K⁺ excretion^Q.

52. Ans. d. Thrombocytopenia (Ref: en.wikipedia.org/wiki/Dextran)

- Dextran interferes with platelet function^Q.

53. Ans. a. Tissue perfusion (Ref: Sabiston 19/e p87; Bailey 26/e p17, 25/e p17)

- Urine output is best clinical guide of tissue perfusion^Q.



54. Ans. c. Hypertonic

55. Ans. c. Cardiopulmonary problem

56. Ans. b. Increase in urine output

57. Ans. a. GH levels decreased

58. Ans. c. 130

59. None

60. Ans. b. 154 mEq

61. Ans. c. Fluid therapy with CVP monitoring

62. Ans. d. Excessive infusion of 5% glucose

63. Ans. c. Both protein and calories would be adequate (Ref: Sabiston 19/e p138; Bailey 25/e p225)

- Calories are calculated by catabolism of glucose (not proteins).

Glucose:

- Amount of glucose in 20% glucose in 3000 ml of solution: $3000 \times 20/100 = 600$ gms
- 1 gm glucose on catabolism produces: 4.2 kcal
- 600 gms of glucose would produce: $600 \times 4.2 = 2520$ kcal

Protein:

- Percentage of protein in fluid: 4.25%
- Percentage of protein in 3000 ml of fluid: $3000 \times 4.25/100 = 127.5$ gms

- Calories required for the patient: $40 \times 65 = 2600$ kcal

- Proteins required for the patient: $2 \times 65 = 130$ gms

	Required Amount	Supplied by solution
Calories	2600 kcal	2520 kcal
Proteins	130 gms	127.5 gm

64. Ans. a. IV fluids only (Ref: Sabiston 19/e p72)

Four Classes of Hemorrhagic Shock (According to the ATLS course)				
	Class			
Parameter	I	II	III	IV
Blood loss (%)	0-15 ^a	15-30 ^a	30-40 ^a	>40 ^a
CNS	Slightly anxious	Mildly anxious	Anxious or confused	Confused or lethargic
Pulse (beats/min)	<100	>100	>120	>140
Blood pressure	Normal	Normal	Decreased ^a	Decreased ^a
Pulse pressure	Normal	Decreased	Decreased ^a	Decreased ^a
Respiratory rate	14-20/min	20-30/min	30-40/min ^a	>35/min ^a
Urine (mL/hr)	>30	20-30	5-15	Negligible ^a
Fluid	Crystalloid ^a	Crystalloid ^a	Crystalloid + blood ^a	Crystalloid + blood ^a

65. Ans. a. Urine output

66. Ans. d. 3% normal saline (Ref: *Fluids and Electrolytes by Lippincott Williams and Wilkins/55*)

Isotonic	Hypertonic	Hypotonic
Dextrose 5% in water	5% dextrose in half normal saline	0.45 normal saline
0.9% normal saline	5% dextrose in normal saline	
Ringer lactate	Dextrose 10% in water	

67. Ans. d. Hyponatremia

68. Ans. b. Suction bottles (Ref: www.ncbi.nlm.nih.gov/pubmed/16756621)

MEASUREMENT OF BLOOD LOSS DURING SURGERY (GRAVIMETRIC METHOD)

- Blood loss during operation is measured by: **Weighing the swabs** after use and subtracting the dry weight and fluid used + **volume of blood collected in suction bottles** (after subtracting irrigating fluid)^Q

69. Ans. c. 130

MISCELLANEOUS

70. Ans. a. Hypertonic dehydration, c. Dumping syndrome

71. Ans. c. Mid-arm circumference (Ref: www.ncbi.nlm.nih.gov/pubmed/1492750)

ANTHROPOMETRIC TECHNIQUES FOR NUTRITIONAL ASSESSMENT

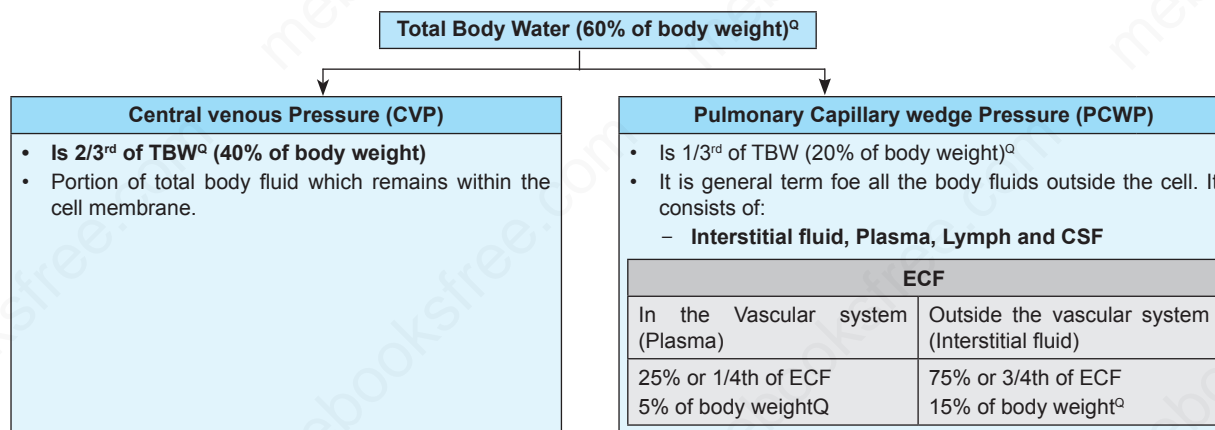
- Anthropometric techniques incorporating measurements of **skinfold thicknesses** and **mid-arm circumference** permit estimations of **body fat** and **muscle mass**, and these are **indirect measures of energy and protein stores**.
 - Skinfold thickness** is measured at **ulnar, triceps, subscapular and suprailiac region**^Q.

72. Ans. d. 3 days (Ref: adc.bmj.com/content/50/7/555.full.pdf)

- The **normal rise in cortisol secretion after surgery** lasts about **3 days**.

73. Ans. b. Fat woman

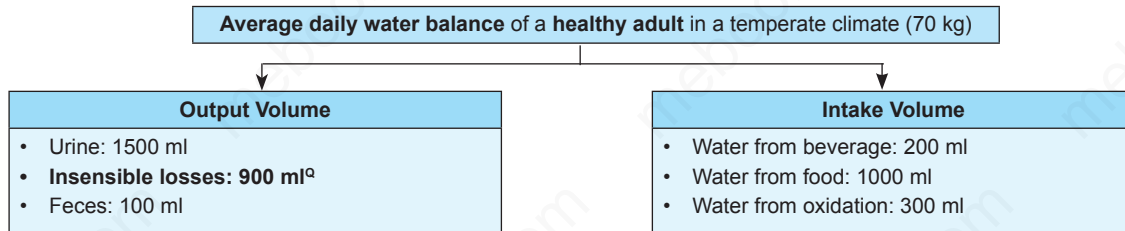
74. Ans. b. 75-80% (Ref: *Sabiston 19/e p104-105; Bailey 25/e p225*)



TOTAL BODY WATER

- In an average **young adult male** 60% of **total body weight** is TBW^Q.
- In an average **young adult female** it is 50%^Q.
- The **lower percentage** of TBW in females correlates with a **higher percentage of adipose tissue** and **lower percentage of muscle mass** in most.^Q
- Estimates of percentage of TBW should be **adjusted downward approximately 10-20% for obese individuals** and **upward by 10% for malnourished individuals**^Q.
- The **highest percentage of TBW** is found in **newborns**, with 80% of their **total body weight^Q** comprised of water. This decreases to approximately 65% by 1 year of age^Q and thereafter remains fairly constant.
- Percentage of protein in 3000 ml of fluid: $3000 \times 4.25/100 = 127.5$ gms

75. Ans. b. 800-1000 ml (Ref: Bailey 25/e p226)



76. Ans. a. 2.5 (Ref: Sabiston 19/e p293)

MENDELSON'S SYNDROME

- Critical pH value: 2.5^o
- Gastric pH of 2.5 or less with a gastric contents volume greater than 25 ml are critical values^o.
- Maximum pulmonary damage is achieved at an aspirate pH value of 1.5.

77. Ans. c. Albumin

78. Ans. d. None

79. Ans. c. i.e., Mid arm circumference (Ref: Sabiston 9/e p40, Sabiston 18/e p154)

Blood Transfusion

MULTIPLE CHOICE QUESTIONS

BLOOD TRANSFUSION

- MC blood transfusion reaction is: (All India 2008)
 - Febrile non-hemolytic transfusion reaction
 - Hemolysis
 - Transmission of infections
 - Electrolyte imbalance
- All of the following infections may be transmitted via blood transfusion, except: (AIIMS May 2009, All India 2002)
 - Parvo B-19
 - Hepatitis G
 - Dengue virus
 - Cytomegalovirus
- Which of the following is the least likely complication after massive blood transfusion? (AIIMS May 2009)
 - Hyperkalemia
 - Citrate toxicity
 - Hypothermia
 - Metabolic acidosis
- Fresh hold blood transfusion is done with in how much time of collection? (DNB 2006)
 - Immediately
 - 1 hours
 - 4 hours
 - 24 hours
- Which of the following investigations should be done immediately to best confirm a non matched blood transfusion reaction? (All India 2010)
 - Indirect Coomb's test
 - Direct Coomb's test
 - Antibody in patient's serum
 - Antibody in donor serum
- Blood components products are: (PGI Dec 2005)
 - Whole blood
 - Platelets
 - Fresh frozen plasma
 - Leukocyte reduced RBC
 - All of the above
- A man is rushed to casualty, nearly dying after a massive blood loss in an accident. There is not much time to match blood groups, so the physician decides to order for one of the following blood groups. Which one of the following blood groups should the physician decide: (AIIMS June 2004)
 - O negative
 - O positive
 - AB positive
 - AB negative
- One unit of fresh blood arises the Hb% concentration by: (All India 2003)
 - 0.1 gm%
 - 1 gm%
 - 2 gm%
 - 2.2 gm%
- Which of the following statements about acute hemolytic blood transfusion reaction is true? (PGI June 2004)
 - Complement mediated hemolysis is seen
 - Type III hypersensitivity is responsible for most cases
 - Rarely life threatening
 - Renal blood flow is always maintained
 - No need for stopping transfusion
- True about blood transfusions: (PGI June 98)
 - Antigen 'D' determines Rh positivity
 - Febrile reaction is due to HLA antigens
 - Anti-d is naturally occurring antibody
 - Cryoprecipitate contains all coagulation factors
- Which of the following is better indicator of need for transfusion? (AIIMS 80, UPSC 87)
 - Urine output
 - Hematocrit
 - Colour of skin
 - Clinical examination
- Massive blood transfusion is defined as: (PGI 95)
 - 350 ml in 5 min
 - 500 ml in 5 min
 - 1 litre in 5 min
 - Whole blood volume
- How long can blood stored with CPDA? (JIPMER 2003)
 - 12 days
 - 21 days
 - 28 days
 - 48 days
- Massive transfusion in previous healthy adult male can cause hemorrhage due to: (PGI 98)
 - Increased t-PA
 - Dilutional thrombocytopenia
 - Vitamin K deficiency
 - Decreased fibrinogen
- Arterial blood gas analysis in a bottle containing heparin causes a decrease in value of:
 - pCO₂
 - HCO₃
 - pH
 - All of the above
- Massive blood transfusion is defined as: (Recent Question 2013)
 - Whole blood volume in 24 hours
 - Half blood volume in 24 hours
 - 40% blood volume in 24 hours
 - 60% blood volume in 24 hours

BLOOD TRANSFUSION COMPLICATIONS

17. After blood transfusion the febrile non-hemolytic transfusion reaction (FNHTR) occurs due to?
 - a. Alloimmunization
 - b. Antibodies against donor leukocytes and HLA Ag
 - c. Allergic reaction
 - d. Anaphylaxis
18. Blood grouping and cross-matching is must prior to infusion of: (MHPGMCET 2007)
 - a. Gelatin
 - b. Dextran
 - c. Albumin
 - d. FFP
19. Blood grouping and cross matching is must prior to infusion of: (MHPGMCET 2008)
 - a. Gelatin
 - b. Albumin
 - c. Dextran
 - d. Hemaceal
20. Collection of blood for cross matching and grouping is done before administration of which plasma expander?
 - a. Hydroxyl ethyl starch
 - b. Dextran (MHSSMCET 2007)
 - c. Mannitol
 - d. Hemaceal
21. Mismatched blood transfusion in anesthetic patient presents is: (PGI June 2000)
 - a. Hyperthermia and hypertension
 - b. Hypotension and bleeding from site of wound
 - c. Bradycardia and hypertension
 - d. Tachycardia and hypertension
22. All of the following are major complications of massive transfusion except: (All India 2006)
 - a. Hypokalemia
 - b. Hypothermia
 - c. Hypomagnesaemia
 - d. Hypocalcaemia
23. Massive transfusions results in: (PGI 88)
 - a. DIC
 - b. Hypothermia
 - c. Hypercalcemia
 - d. Thrombocytopenia

RED BLOOD CELLS

24. The maximum life of a transfused RBC is: (JIPMER 80, DNB 89)
 - a. One hour
 - b. One day
 - c. 15 days
 - d. 50 days
 - E. 100 days

PLATELETS

25. Platelets can be stored at: (AIIMS Nov 2005)
 - a. 20-24°C for 5 days
 - b. 20-24°C for 8 days
 - c. 4-8°C for 5 days
 - d. 4-8°C for 8 days
26. Blood platelets in stored blood do not remain functional after: (PGI 88, 81, AIIMS 86)
 - a. 24 hours
 - b. 48 hours
 - c. 72 hours
 - d. 96 hours
27. In a patient with thrombocytopenia, what is the target platelet count after transfusion to perform an invasive procedure? (AIIMS May 2015)
 - a. 30,000
 - b. 40,000
 - c. 50,000
 - d. 60,000

PLASMA

28. Indication of fresh frozen plasma is/are: (PGI Nov 2011)
 - a. Hypovolemia
 - b. Nutritional supplement
 - c. Coagulation factor deficiency
 - d. Warfarin toxicity
 - e. Hypoalbuminemia
29. True about FFP (Fresh frozen plasma) is the following except: (MHPGMCET 2009)
 - a. Good source of all coagulation factors
 - b. Prepared from single unit of blood
 - c. Coagulation factor levels are equal to Plasma
 - d. None of the above
30. Stored plasma is deficient in: (PGI 79, DNB 90)
 - a. Factors 7 and 8
 - b. Factors 2 and 5
 - c. Factors 5 and 8
 - d. Factors 7 and 9
31. With reference to fresh frozen plasma (FFP), which one of the following statement is not correct? (UPSC 2008)
 - a. It is used as volume expander
 - b. It is stored at -40°C to -50°C
 - c. It is a source of coagulation factors
 - d. It is given in a dose of 12-15 ml/kg body weight
32. In cholecystectomy, fresh frozen plasma should be given: (UPPG 2008)
 - a. Just before operation
 - b. At the time of operation
 - c. 6 hours before operation
 - d. 12 hours after operation
33. Half life of factor VIII is: (PGI 88)
 - a. 4 hours
 - b. 8 hours
 - c. 34 hours
 - d. 48 hours
34. Rosenthal's syndrome is seen in deficiency of factor:
 - a. II
 - b. V (AIIMS 81, DNB 91)
 - c. IX
 - d. XI
35. Best blood product to be given in a patient of multiple clotting factor deficiency with active bleeding: (AIIMS May 2015)
 - a. Whole blood
 - b. Packed RBCs
 - c. Fresh frozen plasma
 - d. Cryoprecipitate

CRYOPRECIPITATE

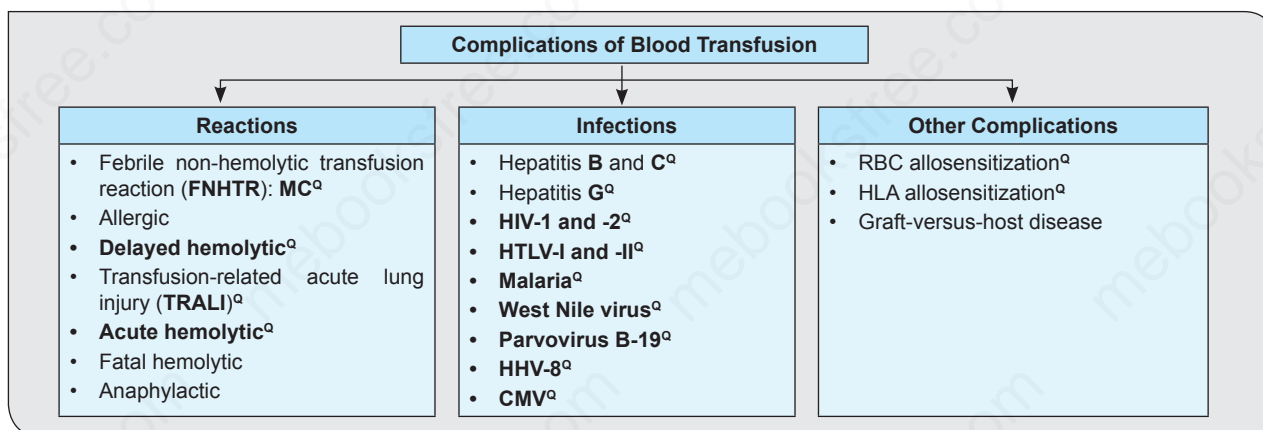
36. Cryoprecipitate contains: (MCI March 2009)
 - a. Factor II
 - b. Factor V
 - c. Factor VIII
 - d. Factor IX
37. Cryoprecipitate is a rich source of: (PGI 79, AIIMS 85)
 - a. Thromboplastin
 - b. Factor VIII
 - c. Factor X
 - d. Factor VII
38. Which one of the following blood fractions is stored at -40°C? (UPSC 2006)
 - a. Cryoprecipitate
 - b. Human albumin
 - c. Platelet concentrate
 - d. Packed red cells
39. Cryoprecipitate contains all except: (MHCET 2016, AIIMS Nov 2007)
 - a. Factor VIII
 - b. Factor IX
 - c. Fibrinogen
 - d. VWF

EXPLANATIONS

BLOOD TRANSFUSION

1. Ans. a. Febrile non-hemolytic transfusion reaction (Ref: Harrison 18/e p954-956)

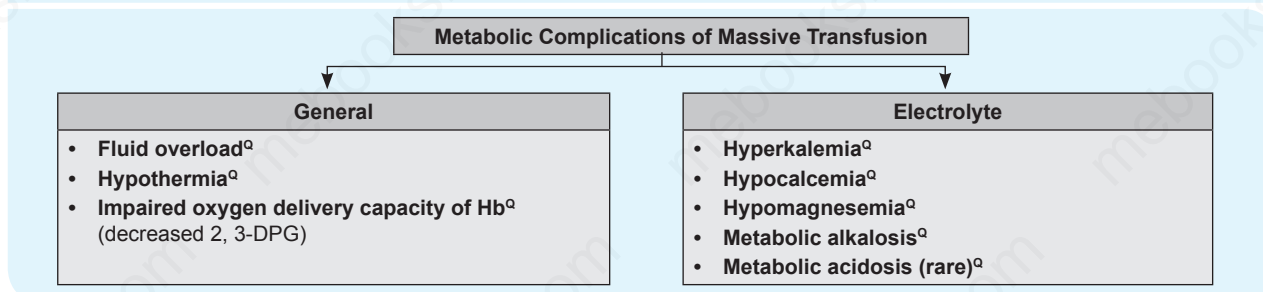
Febrile non-hemolytic transfusion reaction is the most common complication associated with the transfusion of cellular blood components.



2. Ans. c. Dengue virus

3. Ans. d. Metabolic acidosis (Ref: Harrison 18/e p954-956)

- Massive transfusion can lead to coagulopathy and metabolic complications^a.



4. Ans. d. 24 hours

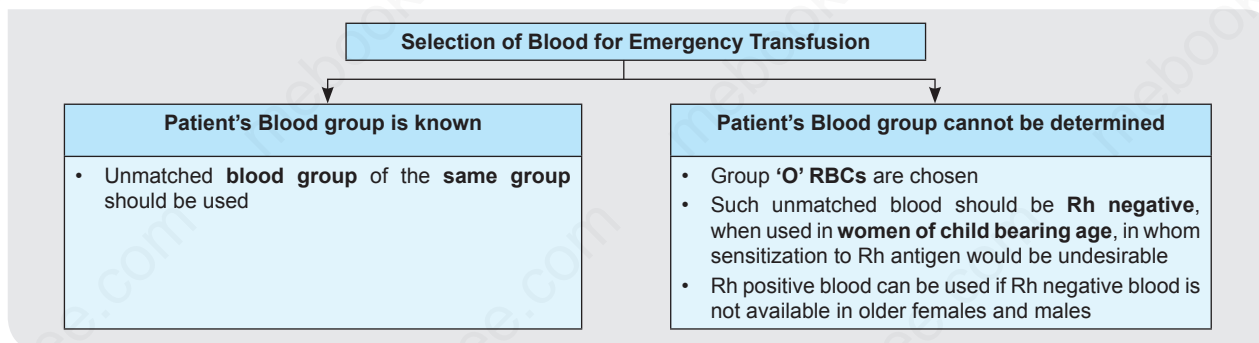
5. Ans. b. Direct Coomb's test (Ref: Harrison 18/e p954)

- Direct Coomb's test or direct antiglobulin test on post-transfusion blood sample from patient should be done to detect antibodies directed against the transfused RBCs^a.

6. Ans. e. All of the above (Ref: Harrison 18/e p952-954)

Characteristics of Selected Blood Components			
Component	Volume (mL)	Content	Clinical Response
Whole Blood	450 ml ± 45	<ul style="list-style-type: none"> No elements removed Contains RBCs, WBCs, plasma and platelets (WBCs and platelets may be non-functional^a) 	<ul style="list-style-type: none"> Not for routine use Used for acute massive bleeding, open heart surgery and neonatal total exchange
Packed RBCs	180–200	<ul style="list-style-type: none"> RBCs with variable leukocyte content and small amount of plasma 	<ul style="list-style-type: none"> Increase Hb 1 gm/dL and hematocrit 3%^a
Platelets	50–70	<ul style="list-style-type: none"> 5.5×10^{10}/RD unit 	<ul style="list-style-type: none"> Increase platelet count 5000–10,000/μL^a
FFP	200–250	<ul style="list-style-type: none"> Plasma proteins: Coagulation factors, proteins C and S, antithrombin^a 	<ul style="list-style-type: none"> Increases coagulation factors about 2%
Cryoprecipitate	10–15	<ul style="list-style-type: none"> Cold-insoluble plasma proteins, fibrinogen, factor VIII, vWF^a 	<ul style="list-style-type: none"> Topical fibrin glue, also 80 IU factor VIII^a

7. Ans. a. O negative (Ref: Harrison 18/e p951; Bailey 26/e p21-22, 25/e p21-22)



8. Ans. b. 1 gm%

9. Ans. a. Complement mediated hemolysis is seen (Ref: Harrison 18/e p954)

- Acute hemolytic transfusion reactions following blood transfusion are **type II hypersensitivity reactions** caused most often by the **complement mediated hemolysis**^Q.
- These reactions are often **life-threatening** and complications include **oliguria** and **acute renal failure (decreased renal blood flow)**^Q.

10. Ans. a. Antigen 'D' determines Rh positivity; b. Febrile reaction is due to HLA antigens (Ref: Harrison 18/e p954)

- Rh positive or negative status depends on the **presence or absence of antigen D (Rh D) on RBCs**^Q.
- Febrile (non-hemolytic) reactions are caused by **antibodies directed against donor leucocytes and HLA antigen may mediate these reactions**^Q.

11. Ans. b. Hematocrit

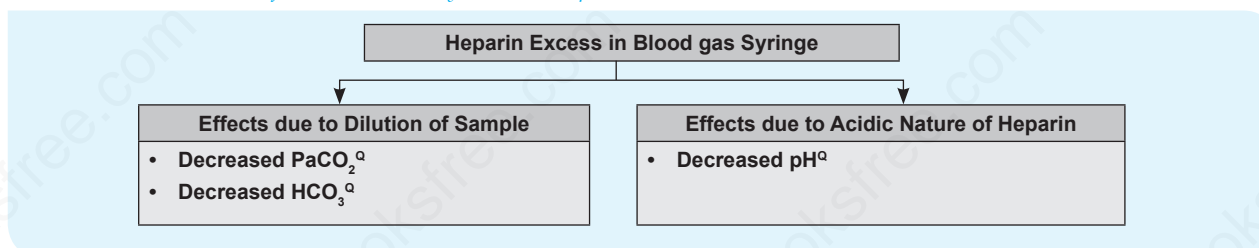
12. Ans. d. Whole blood volume

13. Ans. c. 28 days (Ref: Sabiston 19/e p588)

Whole Blood	
Anticoagulant used	Maximum storage
ACD/CPD/CP2D	21 days ^Q
CPDA-1 (citrate phosphate dextrose adenine)	35 days ^Q

14. Ans. b. Dilutional thrombocytopenia

15. Ans. d. All of the above (Ref: Clinical Laboratory Medicine 6/e p396)



16. Ans. a. i.e., Whole blood volume in 24 hours

According to Sabiston - Massive Blood Transfusion is defined as -

- Transfusion greater than patient's total blood volume in 24 hours
- Or as acute administration of more than 10 units of blood over a few hours.

According to Schwartz "Massive transfusion is a single transfusion of 2500 ml or 5000 ml transfused over a period of 24 hours"

BLOOD TRANSFUSION COMPLICATIONS

17. Ans. b. Antibodies against donor leukocytes and HLA Ag

18. Ans. b. Dextran

19. Ans. c. Dextran

20. Ans. b. Dextran (Ref: en.wikipedia.org/wiki/Dextran)

DEXTRAN

- It is a **polysaccharide polymer** of varying molecular weight producing an **osmotic pressure** similar to the plasma
 - **Disadvantages:**
 - It induces **rouleaux** of RBCs and this **interferes with blood grouping** and **cross matching**^Q procedures, hence need for a blood sample beforehand.
 - It **interferes with platelet function**, hence it is recommended that **total volume** of dextran **should not exceed 1000 mL**.
- **LMW dextran** (short acting) prevents **sludging** of RBCs in vessels and **renal shut down** in severe **hypotension** and it is **less likely to induce rouleaux formation** than HMW dextran (long acting).

21. Ans. b. Hypotension and bleeding from site of wound (Ref: *Schwartz 10/e p119,122,171-172, 9/e p83*)

- Schwartz says "In **patients who are anesthetized** and have an **open wound**, the two dominant signs (of **mismatched blood transfusion**) are **diffuse bleeding** and **hypotension**."
- **MC symptom** of hemolytic transfusion reactions in a **conscious patient**: Sensation of **heat** and **pain along the vein** into which the blood is being transfused^Q.
 - **MC sign** of hemolytic transfusion reactions in a **conscious patient**: **Oliguria**^Q > **hemoglobinuria**.

22. Ans. a. Hypokalemia

23. Ans. a. DIC; b. Hypothermia; d. Thrombocytopenia

RED BLOOD CELLS

24. Ans. d. 50 days (Ref: *Schwartz 10/e p1914-1915, 9/e p78; Bailey 26/e p21, 25/e p21*)

RED BLOOD CELLS

- RBCs are stored at 1-6°C^Q; Mean life of transfused RBCs is 35 days^Q.

Anticoagulant used	Maximum storage
ACD/CPD/CP2D	21 days ^Q
CPDA-1	35 days ^Q

PLATELETS

25. Ans. a. 20-24°C for 5 days

(Ref: *Harrison 18/e p953; Sabiston 19/e p588; Schwartz 10/e p85, 9/e p79; Bailey 26/e p21, 25/e p21*)

PLATELET CONCENTRATES

- **Volume:** 50 ml^Q
- Platelets are the **only blood products** which are stored at **room temperature, 20-24°C** (survival is 4-5 days)^Q.
- **1 unit of platelet** increases the count by 5000-10000^Q.

- The **threshold for prophylactic platelet transfusion** is 10,000/μL^Q.
 - For **invasive procedures**, 50,000/μL platelets is the usual target level.
 - Platelet count should be 1,00,000/μL before accepting the patient **for surgery**.
- Transfused platelets generally **survive for 2-7 days** following transfusion.
- **ABO compatibility** is desirable but **not necessary**.

- **Blood platelets in stored blood** are **non-functional after 24 hours**^Q.

26. Ans. a. 24 hours

27. Ans. c. (50,000) (Bailey 26th/e p23; Nelson 20th/e p2374)

In a patient with thrombocytopenia, target platelet count after transfusion to perform an invasive procedure is 50,000.

Guidelines for Pediatric Platelet Transfusion	
Children & Adolescents:	
1	Maintain PLT count $>50 \times 10^9/L$ with bleeding
2	Maintain PLT count $>50 \times 10^9/L$ with major invasive procedure; $>25 \times 10^9/L$ with minor
3	Maintain PLT count $>20 \times 10^9/L$ and marrow failure WITH hemorrhagic risk factors
4	Maintain PLT count $>10 \times 10^9/L$ and marrow failure WITHOUT hemorrhagic risk factors
5	Maintain PLT count at any level with PLT dysfunction PLUS bleeding or invasive procedure

PLASMA

28. Ans. c. Coagulation factor deficiency; d. Warfarin toxicity (Ref: Harrison 18/e p953; Sabiston 19/e p588)

FRESH-FROZEN PLASMA (FFP)

- FFP is produced from the separation of plasma from donated blood^Q.
- Stored at $-18^\circ C$ and has a shelf life of 1 year^Q.
- Each unit contains 400 mg of fibrinogen and 1 unit activity of each of the clotting factors^Q.

- Most labile clotting factors (V and VIII) may be diminished^Q proportional to shelf life.

- FFP contains stable coagulation factors and plasma proteins: fibrinogen, antithrombin, albumin, proteins C and S^Q.

Indications for FFP

- | | |
|---|--|
| <ul style="list-style-type: none"> • Correction of coagulopathies: <ul style="list-style-type: none"> - Rapid reversal of warfarin^Q - Supplying deficient plasma proteins^Q | <ul style="list-style-type: none"> • Treatment of thrombotic thrombocytopenic purpura^Q |
|---|--|

- Patients who are IgA-deficient and require plasma support should receive FFP from IgA-deficient donors to prevent anaphylaxis.

- FFP should not be routinely used to expand blood volume^Q.
- FFP: An acellular component and does not transmit intracellular infections, e.g., CMV.

29. Ans. a. Good source of all coagulation factors

30. Ans. c. Factors 5 and 8

31. Ans. a. It is used as volume expander

32. Ans. a. Just before operation

The question is incomplete. It should be "A cirrhotic patient with abnormal coagulation needs cholecystectomy, FFP should be given."

FRESH FROZEN PLASMA

- Transfusions with FFP are given to replenish clotting factors^Q.
- The effectiveness of the transfusion in maintaining hemostasis is dependent on the quantity of each factor delivered and its half-life.
- The half-life on the most stable clotting factor, factor VII, is 4 to 6 hours^Q.
- A reasonable transfusion scheme would be to give FFP on call to the operating room.
- This way the transfusion is complete prior to the incision, with circulating factors to cover the operative and immediate postoperative period^Q.

33. Ans. b. 8 hours

- The half life of factor VIII is 8-12 hours.

34. Ans. d. XI (Ref: http://en.wikipedia.org/wiki/Haemophilia_C)

- Hemophilia C (Rosenthal syndrome): Due to factor XI deficiency^Q

35. Ans. c. Fresh frozen plasma (Harrison 19th/e p138 e-3, 18th/e p953; Sabiston 19th/e p588)

Best blood product to be given in a patient of multiple clotting factor deficiency with active bleeding is fresh frozen plasma.

"FFP contains stable coagulation factors and plasma proteins: fibrinogen, antithrombin, albumin, as well as proteins C and S. Indications for FFP include correction of coagulopathies, including the rapid reversal of warfarin; supplying deficient plasma proteins; and treatment of thrombotic thrombocytopenic purpura." - Harrison 19th/e p138 e-3

CRYOPRECIPITATE

36. Ans. c. Factor VIII (Ref: Harrison 18/e p953; Sabiston 19/e p588; Schwartz 10/e p73-75,1599, 9/e p82; Bailey 26/e p21, 25/e p21)

CRYOPRECIPITATE

- Cryoprecipitate is a source of fibrinogen^Q, factor VIII^Q and von Willebrand factor (vWF)^Q.
- It is ideal for supplying fibrinogen to the volume-sensitive patient.
- Stored at $\leq -18^{\circ}\text{C}$
 - 1 unit of cryoprecipitate contains 80-145 units of Factor VIII and 250 mg of fibrinogen^Q.
 - Cryoprecipitate is pooled from many donors, so there are maximum chances of disease transmission among all blood products^Q.
- Cryoprecipitate may also supply vWF to patients with dysfunctional (type II) or absent (type III) von Willebrand disease.

37. Ans. b. Factor VIII

38. Ans. a. Cryoprecipitate

39. Ans. b. Factor IX

MULTIPLE CHOICE QUESTIONS

SHOCK

- Shock is clinically best assessed by: (PGI Dec 97)
 - Urine output
 - CVP
 - BP
 - Hydration
- Which of the following is the best parameter to assess fluid intake in a poly-trauma patient? (All India 94)
 - Urine output
 - BP
 - Pulse
 - Pulse oximetry
- Following is the most important factor in the management of shock: (AIIMS 84)
 - Blood pressure
 - Cardiac output
 - CVP to 8 cm of water
 - Deficiency of effective circulation
- Which of the following is true for shock? (MCI Sept 2005)
 - Hypotension
 - Hypoperfusion to tissues
 - Hypoxia
 - All of the above
- Neurogenic shock is characterized by: (AIIMS May 2014)
 - Hypertension and tachycardia
 - Hypertension and bradycardia
 - Hypotension and tachycardia
 - Hypotension and bradycardia

HEMORRHAGIC SHOCK

- Immediate management of a patient with multiple fracture and fluid loss includes the infusion: (All India 94)
 - Blood
 - Dextran
 - Normal saline
 - Ringer lactate
- Hemorrhage leads to: (MCI Sept 2005)
 - Septic shock
 - Neurogenic shock
 - Hypovolemic shock
 - Cardiogenic shock
- In traumatic cases, shock is most likely due to: (DNB 2011, MCI Sept 2007)
 - Injury to intra abdominal solid organ
 - Head injury
 - Septicemia
 - Cardiac failure
- Which of the following is ideal in moderate hemorrhagic shock? (Karnataka 2012, MCI Sept 2007)
 - Dextrose
 - Ringer lactate

- Blood
- Dextran

- Compensatory mechanism in a patient with hypovolemic shock: (JIPMER 2011)
 - Increased renal blood flow
 - Decrease in cortisol
 - Decrease in vasopressin
 - Decreased cutaneous blood flow
- Features of hypovolemic shock are all except: (NIMHANS 86)
 - Oliguria
 - Bradycardia
 - Low BP
 - Acidosis
- One of the following is earliest indication of concealed acute bleeding: (All India 95)
 - Tachycardia
 - Postural HT
 - Oliguria
 - Cold clammy fingers
- Blood loss in class II hemorrhagic shock is: (Recent Question 2013)
 - <15%
 - 15-30%
 - 30-40%
 - >40%
- Most common type of shock in emergency room is: (Recent Question 2013)
 - Cardiogenic
 - Hypovolemic shock
 - Obstructive
 - Neurogenic
- Most common type of shock in surgical practice: (DNB 2014)
 - Cardiogenic
 - Hypovolemic
 - Neurogenic
 - Septic shock
- Most common feature of polytrauma in pediatric age group is: (Recent Question 2015)
 - Hypothermia
 - Hypovolemic shock
 - Hypotension
 - Hypoxemia

SEPTIC SHOCK

- The most important cause of the death in septic shock is:
 - DIC
 - Respiratory failure
 - Renal
 - Cardiac
- 35-years old Mona developed feature of septicemia. Shock in form of hypotension and low urine output. She was being treated for colonic necrosis. What will be the management? (AIIMS June 99)
 - IV fluids + dopamine
 - IV fluids only
 - Only dopamine
 - Antibiotic in high dose

19. Plasma expanders are used in: (NEET 2013, Recent Question 2013, DNB 2012)

- a. Septic shock
- b. Vasovagal shock
- c. Neurogenic shock
- d. Cardiogenic shock

MISCELLANEOUS

20. Blood clot the size of a clenched fist is roughly equal to:

- a. 250 ml
- b. 350 ml
- c. 500 ml
- d. 600 ml

21. What is normal pulmonary capillary wedge pressure?

- a. 4-8 mm of Hg
- b. 8-12 mm of Hg
- c. 12-16 mm of Hg
- d. 15-25 mm of Hg

22. A patient with spine, chest and abdominal injury in road traffic accident developed hypotension and bradycardia.

Most likely reason is: (AIIMS Nov 2013)

- a. Hypovolemic shock
- b. Hypovolemic + neurogenic shock
- c. Hypovolemic + septicemic shock
- d. Neurogenic shock

23. Patient is on shock. IV cannulation not possible, intraosseous line for IVF should be done within: (WBPG 2014)

- a. 1 minute
- b. 1.5 minutes
- c. 2 minutes
- d. 2.5 minutes

24. Green coloured IV cannula, the size is: (Recent Question 2015)

- a. 18
- b. 20
- c. 22
- d. 24

SEPTIC SHOCK

17. Ans d. Cardiac (Ref: Sabiston 19/e p85; Schwartz 10/e p127,171, 9/e p102-103; Bailey 26/e p14-15, 25/e p14-15)

- Hypotension is the MC cause of death in septic shock^Q.
- Cardiac output is decreased in septic shock, leading to hypotension^Q.

18. Ans b. IV fluids only (Ref: Sabiston 19/e p85; Schwartz 10/e p124-126, 9/e p102-103; Bailey 26/e p16-18, 25/e p16-18)

TREATMENT OF SEPTIC SHOCK

- First line of treatment: Aggressive volume expansion with crystalloid solution^Q and restoration of arterial oxygenation with inspired oxygen and frequently with mechanical ventilation are the highest priorities^Q.
- Second line: Inotropic support with dopamine, norepinephrine, or vasopressin^Q in the presence of hypotension or dobutamine^Q if arterial pressure is normal.
- High dose activated protein C (APC)^Q provides a survival benefit in patients with severe sepsis and septic shock
- Plasma expanders are useful as septic shock is associated with peripheral vasodilatation causing reactive hypovolemia
- Antibiotics and surgical debridement or drainage to control infection^Q

19. Ans a. Septic shock

MISCELLANEOUS

20. Ans c. 500 ml (Ref: Bailey 24/e p61)

- Blood clot of size of a clenched fist is roughly equal to 500 ml^Q.

21. Ans b. 8-12 mm of Hg (Ref: Bailey 26/e p17, 25/e p17)

PULMONARY CAPILLARY WEDGE PRESSURE (PCWP)

- It is a better indicator for both blood volume and left ventricular function than CVP^Q.
- Obtained by pulmonary artery floatation balloon catheter (Swan-Ganz)^Q.
- Normal PCWP: 6-12 mm Hg^Q
- Used to differentiate left and right ventricular failure, pulmonary embolism, septic shock and ruptured mitral valve^Q
- Accurate guide to therapy with fluids, inotropic agents and vasodilators^Q.
- May also be used to measure cardiac output by thermodilution technique^Q.

22. Ans d. Neurogenic shock (Ref: Harrison 18/e p2222, 2219)

A patient with spine, chest and abdominal injury in road traffic accident developed hypotension and bradycardia. Most likely reason is neurogenic shock.

"Neurogenic shock: In addition to arteriolar dilation, venodilation causes pooling in the venous system, which decreases venous return and cardiac output."- Harrison 18th/2222

NEUROGENIC SHOCK

- Interruption of sympathetic vasomotor input after a high cervical spinal cord injury, inadvertent cephalad migration of spinal anesthesia, or devastating head injury may result in neurogenic shock.

- In addition to arteriolar dilation, venodilation causes pooling in the venous system, which decreases venous return and cardiac output.

- The extremities are often warm, in contrast to the usual sympathetic vasoconstriction-induced coolness in hypovolemic or cardiogenic shock.

Treatment

- Treatment involves a simultaneous approach to the relative hypovolemia and to the loss of vasomotor tone.
- Excessive volumes of fluid may be required to restore normal hemodynamics if given alone.
- Once hemorrhage has been ruled out, norepinephrine or a pure alpha-adrenergic agent (phenylephrine) may be necessary

Physiologic Characteristics of the Various Forms of Shock				
Type of Shock	CVP and PCWP	Cardiac Output	SVR	Venous O ₂ Saturation
Hypovolemic	↓	↓	↑	↓
Cardiogenic	↑	↓	↑	↓
Septic				
Hyperdynamic	↑↓	↓	↓	↑
Hypodynamic	↑↓	↑	↑	↑↓
Traumatic	↓	↑↓	↑↓	↓
Neurogenic	↓	↓	↓	↓
Hypoadrenal	↑↓	↓	=↓	↓

23. Ans b. 1.5 minutes

- Guidelines state that, during CPR in children aged younger than 6 years, intraosseous access should be obtained if there is inability to achieve reliable venous access after **three attempts or 90 seconds**, whichever comes sooner. Intraosseous access has the same benefits in children aged over 6 years but access to the anterior tibial marrow is more difficult and other sites such as the lower femur, iliac crest or sternum should be considered.

24. Ans a. 18

Miscellaneous

MULTIPLE CHOICE QUESTIONS

- Most important technical consideration at the time of doing below knee amputation is:** (AIIMS Nov 2000)
 - Posterior flap should be longer than the anterior flap
 - Stump should be long
 - Stump should be short
 - Anterior flap should be longer than posterior flap
- Referred pain from all of the following conditions may be felt along the inner side of right thigh, except:** (All India 2006)
 - Inflamed pelvic appendix
 - Inflamed ovaries
 - Stone in pelvic ureter
 - Pelvic abscess
- Following are true about William Halsted:** (PGI June 2008)
 - First person to receive nobel prize in surgery
 - Pioneered introduction of gloves
 - Promoted radical approach for breast surgery
 - Pioneered role of antibiotics
- FNAC needle size:** (AIIMS Nov 2007)
 - 18-22
 - 22-26
 - 27-29
 - 16-18
- Bee venom can be neutralized by applying:** (PGI 88)
 - Soda bicarbonate
 - Vinegar
 - Lemon juice
 - Dilute HCL
- The most dangerous injury is:** (PGI 88)
 - Snake bite
 - Scorpion bite
 - Wasp sting
 - Human bite
- The best site for intramuscular injection is:** (PGI 88)
 - Deltoid
 - Anterolateral part of thigh
 - Upper outer segment of buttocks
 - Upper inner segment of buttocks
- Hereditary spherocytosis is transmitted as:** (PGI 85)
 - Autosomal dominant
 - Autosomal recessive
 - X-linked dominant
 - X-linked recessive
- Subcutaneous calcification are seen in:** (JIPMER 93)
 - Gout
 - Hyperparathyroidism
 - Onchocytosis
 - Malignancies
- In polycythaemia vera the most common postoperative complication following major surgery is:** (PGI 91, AMU 87)
 - Thrombosis
 - Gastric ulcer
 - Diabetes insipidus
 - Haemorrhage
- Biot's respiration is seen in:** (JIPMER 88, AI 90)
 - Hypnosedative poisoning
 - Appendicitis
 - Cholecystitis
 - Bulbar poliomyelitis
- 'Sterile needle test' helps in differentiating:** (Gujrat 2014, JIPMER 81, AIIMS 86)
 - Healing process
 - Depth of burns
 - Degenerative process
 - Infection
- Van Buchem's syndrome is characterized by all except:** (Gujrat 2014, PGI 80, Rohtak 86)
 - Overgrowth
 - Distortion of mandible
 - Facial Palsy
 - Increased acid phosphatase
- The stage of myasthenia gravis that best responds to thymectomy is:** (AIIMS 80, 81, PGI 86)
 - Stage 1: active
 - Stage 2: Inactive
 - Stage 3: burnt out
 - Those with thymoma
- Quant's sign (a T-shaped depression in the occipital bone) may be present in:** (Gujrat 2014, JIPMER 81, AIIMS 84)
 - Down's syndrome
 - Head injury
 - Rickets
 - Scurvy
- Nezelof's syndrome is recurrent episodes of:** (Gujrat 2014, JIPMER 81, DNB 90)
 - Appendicitis
 - Cholecystitis
 - Intestinal obstruction
 - Pneumonia
- Hickey-Hare test is used to diagnose:** (Gujrat 2014, PGI 81, AIIMS 86)
 - Congenital pyloric stenosis
 - Doudenal atresia
 - Achlasia cardia
 - Diabetes insipidus
- Usually employed technique for splanchnic block is:** (JIPMER 79, AIIMS 80)
 - Braun's method
 - Kappi's method
 - Wending's method
 - None of the above
- Secondary amyloidosis occurs in:** (JIPMER 80, AIIMS 82)
 - Chronic osteomyelitis
 - Rheumatoid arthritis
 - Leprosy
 - Syphilis
- Arrow headed finger on X-ray is suggestive of:** (PGI 83, 85)
 - Acromegaly
 - Hyperparathyroidism
 - Down's syndrome
 - Sarcoidosis
- A Seldinger needle is used for:** (AIIMS 81, AMC 87)
 - Liver biopsy
 - Suturing skin
 - Arteriography
 - Lymphography

22. Blongnini's symptom (a feeling of crepitation occurring from gradual increasing pressure on the abdomen) is seen in: (Gujrat 2014, PGI 80, 81, AIIMS 84)
 a. Congenital pyloric stenosis b. Gastric polyp
 c. Duodenal atresia d. Measles
23. Mauriac's syndrome is characterized by the following except: (Gujrat 2014, JIPMER 81, AIIMS 86)
 a. Diabetes b. Obesity
 c. Dwarfism d. Cardiomegaly
24. A cricoids hook is used particularly: (JIPMER 81, DNB 89)
 a. In thyroidectomy
 b. In block dissection of the neck
 c. For retracting the superior laryngeal nerve
 d. In tracheostomy
25. Not a premalignant ulcer: (Kerala 94)
 a. Bazin's ulcer b. Paget's disease of nipple
 c. Marjolin's ulcer d. Lupus vulgaris
26. During endotracheal intubation, unilateral breath sounds, no air heard entering the stomach and no gastric distension is suggestive of entry of the endotracheal tube into: (UPSC 96)
 a. Right main bronchus b. Esophagus
 c. Mid-trachea d. Left main bronchus
27. Aminopeptidase is elevated in obstruction of: (Assam 96)
 a. Ureter b. Urethra
 c. CBD d. Bladder
28. Sappey's line denotes a line: (Karnataka 95)
 a. Encircling the neck at C6 vertebra level
 b. Encircling the trunk just above the umbilicus
 c. Encircling the salpigin tubes
 d. None of the above
29. Hormonal treatment is given for which of the following malignancy? (Kerala 96)
 a. Choriocarcinoma b. Carcinoma prostate
 c. Hepatoma d. Teratoma
 e. Granulosa cell tumour
30. A female patient complains of periumbilical pain and nausea particularly after taking food. The diagnosis is: (UPPG 95)
 a. Meckel's diverticulum b. Peptic ulcer syndrome
 c. Lactose intolerance d. None
31. Most common tumour among children 1-5 years in South Africa is: (TN 96)
 a. Neuroblastoma b. Wilm's tumour
 c. Neurofibroma d. Burkitt's lymphoma
32. First neurosurgeon of India: (SCTIMS 98)
 a. Jacob Chandy b. Jacob Abraham
 c. K.V. Mathal d. Mathew Chandy
33. Local anesthetics cannot be used at the site of infection because it causes: (MAHE 2001)
 a. Spread of infection b. Lowered efficiency
 c. Both d. None
34. All are true about long flexor tendons except: (Kerala 95)
 a. Flexor digitorum profundus inserted to distal phalanx
 b. Flexor digitorum superficialis attached to the sides of middle phalanx
 c. Damage to the tendons involves formation of tenoma during repair
 d. Good repair results if tendon sheath is damaged
35. No man's land in palm corresponds: (Gujrat 2014, MAHE 98)
 a. Zone I b. Zone II
 c. Zone III d. Zone IV
36. Failure of migration of neural crest cells is seen in: (Kerala 2001)
 a. Albinism b. Congenital megacolon
 c. Odonotomes d. Adrenal tumour
37. Hypothermia is used in all except: (PGI 98)
 a. Cardiac surgery b. Neonatal ischemia
 c. Heat stroke d. Cardiac arrhythmia
38. The commonest symptom post operatively seen is: (Kerala 97)
 a. Depression b. Psychosis
 c. Euphoria d. None of the above
39. The most sensitive qualitative method for detection of air embolism is: (Gujrat 2014, PGI 79, AIIMS 86)
 a. Doppler ultra sound b. ECG
 c. Arterial pressure
 d. End expiratory carbon dioxide content
40. Fiberoptic endoscopy is contraindicated in: (PGI 98)
 a. Children b. Aneurysm of arch of aorta
 c. Cervical spondylosis d. Hemoptysis
41. Depressed bridge of nose can be due to any of the following except: (Karnataka 2003)
 a. Leprosy b. Syphilis
 c. Thalassemia d. Acromegaly
42. In sickle cell anemia sudden onset of pancytopenia with hemolysis and no rise of reticulocyte count occurs in: (JIPMER 2004)
 a. Sequestration crisis b. Aplastic crisis
 c. Hemolytic crisis d. Vaso-occlusive crisis
43. Who said these words: To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all? (Karnataka 2004)
 a. Hamilton Bailey b. Sir Robert Hutchison
 c. Sir William Osler d. J.B. Murphy
44. In the acronym "Swelling" used for the history and examination of a lump or swelling, the letter 'N' stands for: (Karnataka 2004)
 a. Nodes b. Noise (Thrill/bruit)
 c. Numbness d. Neurological effects
45. Lamina dura lining the alveolus is: (Karnataka 2002)
 a. Cancellous bone b. Ligament
 c. Dense cortical bone d. Muscle
46. Vidian neurectomy is indicated in: (MAHE 2005)
 a. Glossopharyngeal neuralgia
 b. Trigeminal neuralgia
 c. Vasomotor rhinitis
 d. Atrophic rhinitis
47. Orthobaric oxygen is used in: (MAHE 2005)
 a. Carbon monoxide poisoning
 b. Ventilation failure
 c. Anaerobic infection
 d. Gangrene
48. 'Tennis elbow' is characterized by: (MAHE 2005)
 a. Tenderness over the medial epicondyle
 b. Tendinitis of common extensor origin
 c. Tendinitis of common flexor origin
 d. Painful flexion and extension
49. Pelvic exenteration is known as: (Gujrat 2014, APPG 2006)
 a. Miles Operation b. Lyods operation
 c. Finch operation d. Brunswigs operation
50. About congenital torticollis all are except: (AIIMS Nov 2006)
 a. Always associated with breech extraction
 b. Spontaneous resolution in most cases
 c. 2/3rd cases have palpable neck mass at birth
 d. Uncorrected cases develop plagiocephaly

51. Dye used in chromoendoscopy for detection of cancer:

(AIIMS May 2009)

- a. Gentian violet b. Toluidine blue
- c. Hemotoxiline and eosine d. Methylene blue

52. Concomitant chemoradiotherapy is indicated in all of the following except:

(All India 2009)

- a. Stage IIIB CA cervix
- b. T2 N0 M0 anal cancer
- c. T2 N0 M0 glottic cancer
- d. T1 N2 M0 Nasopharyngeal cancer

53. Smoking may be associated with all of the following cancer's except:

(All India 2009)

- a. CA Larynx b. CA Nasopharynx
- c. CA Bladder d. CA Esophagus

54. Hutchinson and Pepper syndrome is a feature of:

(COMEDK 2004)

- a. Von Recklinghausen's b. Neuroblastoma
- c. Renal cell carcinoma d. Meningioma

55. Not a submucosal lesion:

(Punjab 2009)

- a. Lipoma b. Ranula
- c. Carcinoid d. None

56. Frozen section is/are used for:

(PGI Nov 2009)

- a. Enzyme
- b. Intraoperative histopathological examination
- c. Fat
- d. Acid fast bacilli
- e. To check surgical margin in tumor surgery

57. Condition associated with panniculitis is/are: (PGI Nov 2009)

- a. Pancreas cancer b. Chronic pancreatitis
- c. Acute pancreatitis d. Pancreatic divisum
- e. Posttraumatic pancreatitis

58. True about apocrine gland:

(PGI June 2009)

- a. Modified sweat gland
- b. Modified sebaceous gland
- c. Present in axilla and groin
- d. Hidradenitis suppurativa is infection of apocrine gland

59. Not associated with fat necrosis:

(PGI June 2009)

- a. Liposuction b. Radiotherapy
- c. Mammoplasty d. Carcinoma breast
- e. Following trauma

60. Which of the following is the most commonly used 'fixative' in diagnostic pathology?

- a. Formaldehyde b. Ethyl alcohol
- c. Mercuric chloride d. Picric acid

61. Aflatoxins are produced by:

(All India 2011)

- a. Aspergillus flavus b. Aspergillus niger
- c. Aspergillus fumigates d. Candida

62. Axillary abscess is safely drained by which approach?

(AIIMS May 2011)

- a. Medial b. Posterior
- c. Lateral d. Floor

63. Topical mitomycin C is used in :

(AIIMS May 2011)

- a. Basal skull carcinoma
- b. Tracheal stenosis
- c. Skull base osteomyelitis
- d. Angiofibroma

64. Fixative used in histopathology:

(AIIMS May 2012)

- a. 10% buffered neutral formalin
- b. Bouins fixative
- c. Glutaraldehyde
- d. Ethyl alcohol

65. Potato nodes are feature of:

(DNB 2010)

- a. Sarcoidosis
- b. Tuberculosis
- c. Carcinoid
- d. Lymphoma

66. Moures sign is seen in:

(Recent Questions 2013)

- a. Carcinoma
- b. Appendicitis
- c. Varicose vein
- d. Pancreatitis

67. Choose the Wrong combination of cancer and its suspected carcinogen: (APPG 2016) Place it after question no. 66 in chapter no 51 miscellaneous.

- a. Tobacco - bladder
- b. Phenacetin - lung
- c. Arsenic - skin
- d. Vinyl chloride - liver

EXPLANATIONS

1. Ans. a. Posterior flap should be longer than the anterior flap (Ref: Sabiston 19/e p1742; Bailey 26/e p892, 25/e p916-917)

BELOW KNEE AMPUTATION

- **Posterior flap** should be **longer than anterior flap** as the **posterior skin** has a **good blood supply** (anterior skin has poor due to lack of muscle an anterior aspe ct). Good blood supply **helps in easy healing of stump**°.
 - Equally short anterior and posterior flaps are used only when the long posterior flap technique is not feasible because of previous wounds or extensive tissue ischemia.
- **Longer stump is better in general for amputation at all sites except below knee amputation**°.
- **Best level for below knee amputation** (as for prosthetic fitting is concerned): At the **distal musculotendinous junction** of the **gastrocnemius muscle**°.

2. Ans. d. Pelvic abscess

3. Ans. b. Pioneered introduction of gloves, c. Promoted radical approach for breast surgery en.wikipedia.org/wiki/William_Stewart_Halsted

CONTRIBUTIONS OF WILLIAM STEWARD HALSTED (FATHER OF 'SAFE' SURGERY)

- **First emergency blood transfusion** was performed on his sister
- Development of **Halsted radical mastectomy**°
- Invention of **surgical gloves**°

4. Ans. b. 22-26 www.ncbi.nlm.nih.gov/pubmed/17405171

- **FNAC Needle Size: 21-25 gaue**°

5. Ans. a. Soda bicarbonate (Ref: Harrison 18/e p3581)

Bee venom can be **neutralized** by applying **soda bicarbonate**

6. Ans. a. Snake bite 7. Ans. c. Upper outer segment of buttocks

8. Ans. a. Autosomal dominant

9. Ans. b. Hyperparathyroidism, d. Malignancies (Ref: radiographics.rsna.org/content/19/suppl_1/S11.full)

- **Subcutaneous calcifications** are seen in both **hyperparathyroidism** and **malignancies**°.

10. Ans. a. Thrombosis (Ref: Harrison 18/e p900)

- **Thrombosis: MC postoperative complication** following major surgery in **polycythemia vera**°.

11. Ans. None en.wikipedia.org/wiki/Biot's_respiration

Biot's respiration is seen in **raised ICT**.

12. Ans. b. Depth of burns (Ref: Sabiston 19/e p522; Schwartz 9/e p199)

- **'Sterile needle test'** helps in **differentiating depth of burns**.

13. Ans. b. Distortion of mandible <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1376897/>

VAN BUCHEM DISEASE

- Van Buchem disease (**hyperostosis corticalis generalisata**) is an **autosomal recessive** disorder characterized by **hyperostosis of the skull, mandible, clavicles, ribs, and diaphyseal cortices of the long bones**°.
- **Most striking clinical features** are the **enlargement of the jaw** and **thickness of the skull**, which may lead to **facial nerve palsy, hearing loss, and optic atrophy**°.

14. Ans. a. Stage 1 active onlinelibrary.wiley.com/doi/10.1002/bjs.1800650503/pdf

- **Stage I, the active stage**, is **characterized by remissions** and **best respond to thymectomy**°.

15. Ans. c. Rickets <http://www.kmle.com/search.php?Search=Quant's%20s>.

QUANT'S SIGN

- A **T-shaped depression** in the **occipital bone** occurring in many cases of **rickets**, especially in **infants lying constantly in bed** with pressure on the **pressure on the occiput**°.

16. Ans. d. Pneumonia en.wikipedia.org/wiki/Nezelof_syndrome

NEZELOF SYNDROME

- Nezelof syndrome (also known as "Thymic dysplasia with normal immunoglobulins")
- An **autosomal recessive** congenital immunodeficiency condition due to underdevelopment of the thymus.
- It causes **severe infections** and **malignancies**^Q.
- **Treatment:** Antimicrobial therapy, IV immunoglobulin, bone marrow transplantation, thymus transplantation and thymus factors.

17. Ans. d. Diabetes insipidus (Ref: medical-dictionary.thefreedictionary.com/Hickey-Hare+tes)

HICKEY-HARE TEST

- Hickey-Hare test is **hypertonic saline infusion test** that induces plasma hyperosmolality.
- Used for **distinguishing between different causes of polyuria and polydipsia**^Q.

18. Ans. a. Braun's method (Ref: [Lee Anesthesia \(2005\)/449](#))

SPLANCHNIC BLOCK

- Splanchnic block can be performed **from the front** (Braun^Q, Wendling), or **from behind** (Kappis).

19. Ans. a. Chronic osteomyelitis, b. Rheumatoid arthritis, c. Leprosy (Ref: [Harrison 18/e p945-949](#))

AMYLOIDOSIS

Copy: CBS pathology table 7 page 154

- Amyloidosis is a pathological proteinaceous substance **deposited between cells**^Q in various tissues and organs of the body in a variety of clinical settings.

TYPES OF AMYLOID PROTEIN

- **AL (Amyloid Light chain):**
 - This is **derived from plasma cells**^Q and contains immunoglobulin light chains
 - Associated with **primary amyloidosis** and immunocyte dyscrasias with amyloidosis like **multiple myeloma**^Q
 - **AA (Amyloid Associate protein):**
 - It is unique non-immunoglobulin protein synthesized by **reticuloendothelial cells of liver**^Q.
 - Associated with **secondary amyloidosis** and **reactive systemic amyloidosis**^Q.
- Chronic inflammatory conditions: Tuberculosis^Q, Bronchiectasis^Q, Osteomyelitis^Q
 - **Connective tissue disorders:** Rheumatoid Arthritis (MC)^Q, Ankylosing spondylitis^Q and Primary biliary cirrhosis^Q
 - **Non immune derived tumors:** Renal cell carcinoma^Q and Hodgkin's lymphoma^Q
- β_2 microalbumin ($A\beta_2m$): Hemodialysis associated amyloidosis^Q
 - β_2 Amyloid protein: Senile cerebral^Q, Alzheimer's disease^Q
 - Transthyretin (ATTR): Familial amyloidotic neuropathies^Q and Systemic senile amyloidosis^Q
 - Calcitonin associated amyloid (A cal): **Medullary CA thyroid**^Q
 - Islet amyloid peptide (AIAPP): **Type II DM**^Q
 - Atrial natriuretic factor associated amyloid: Isolated atrial Amyloidosis and Misfolded prion protein (PrPsc) disease
- Common Biopsy sites in Amyloidosis: Subcutaneous abdominal fat aspirate^Q, Rectum^Q, Skin^Q, Gingiva^Q

20. Ans. a. Acromegaly www.acromegalycommunity.com/blog

- **Arrow headed finger** on X-ray is suggestive of **Acromegaly**^Q.

21. Ans. c. Arteriography (Ref: [Sabiston 19/e p1733](#); [Schwartz 10/e p1051, 9/e p751](#); [Bailey 25/e p903](#))

Seldinger needle is used for **angiography** (arteriography).

ARTERIOGRAPHY

- **Aortic and lower extremity arteriograms** are generally performed by **needle puncture** of the **femoral**^Q or **brachial arteries**^Q followed by **guidewire placement** and **catheter insertion** using the **Seldinger technique**.

22. Ans. d. Measles

23. Ans. d. Cardiomegaly en.wikipedia.org/wiki/Mauriac_syndrome

MAURIA SYNDROME

- **Mauriac syndrome** is a rare complication in children and adolescents with **diabetes mellitus type 1**, characterized by **hepatomegaly**, **growth impairment**, and **cushingoid features**^Q.

24. Ans. d. In tracheostomy www.hopkinsmedicine.org

- A **cricoids hook** is used in **tracheostomy**^Q.

25. Ans. a. Bazin's ulcer emedicine.medscape.com/article/1083213-overview

BAZIN DISEASE

- Bazin disease (or "Erythema induratum") is a panniculitis on the back of the calves^Q.
- It is now considered a panniculitis that is not associated with a single defined pathogen^Q.
- It occurs mainly in women^Q, but is very rare now.

26. Ans. a. Right main bronchus

27. Ans. c. CBD (Ref: American Journal of Gastroenterology; Dec1963, Vol. 41 Issue 6, p620)

LEUCINE AMINOPEPTIDASE

- Increased Leucine aminopeptidase (LAP) activity is seen in:
 - Carcinoma of the pancreas, choledocholithiasis, acute pancreatitis^Q
 - Viral hepatitis, cirrhosis, carcinoma with liver metastases^Q
- In common bile duct obstruction, whether due to carcinoma pancreas or choledocholithiasis, the elevated serum LAP levels returned to normal following relief of the obstruction. This is in agreement with the hypothesis that the increased serum LAP activity in these conditions is the result of bile duct obstruction.

28. Ans. b. Encircling the trunk just above the umbilicus (Ref: Principles and Practice of General Surgery by Kirby I. Bland, Michael G. Sarr, Markus W. Büchler (2008) Volume 1/1592)

SAPPEY'S LINE

- Sappey's line defines a band of skin extending from the umbilicus^Q, along the iliac crests over to L1.
- This line divides sites which drain to axilla above, groin below or both sites^Q.

29. Ans. b. Carcinoma prostate

30. Ans. a. Meckel's diverticulum

31. Ans. d. Burkitt's lymphoma www.ncbi.nlm.nih.gov/pubmed/19661660

- Commonest tumour among children 1-5 years in South Africa is Burkitt's lymphoma.

32. Ans. a. Jacob Chandy www.cmch-vellore.edu/pdf/jacob.pdf

- Jacob Chandy: Pioneering Neurosurgeon of India^Q

33. Ans. c. Both

34. Ans. d. Good repair results if tendon sheath is damaged

35. Ans. b. Zone II (Ref: Apley's 8/636-638)

Bunnel's no-man's land is Zone II.

ZONE II (NO MAN'S LAND OR DANGEROUS AREA OF HAND^Q)

- Situated between the opening of the flexor sheath (the distal palmar crease) and insertion of flexor superficialis (flexor crease of proximal interphalangeal joint)^Q
- Also known as "No man's land" or dangerous area of hand^Q.
- The result of flexor tendon repair is worst in this area because both superficial and deep tendons run together in a tight sheath and passes through three pulleys.

36. Ans. b. Congenital megacolon

37. Ans. b. Neonatal ischemia, d. Cardiac arrhythmia (Ref: Schwartz 9/e p674)

38. Ans. d. None of the above

POST-OPERATIVE PSYCHIATRIC SYMPTOMS

- Delirium^Q (20%) > Depression (9%) > Dementia (3%) > Functional psychosis (2%).

39. Ans. d. End expiratory carbon dioxide content (Ref: Schwartz 9/e p787-789)

40. Ans. b. Aneurysm of arch of aorta emedicine.medscape.com/article/1890999-overview

- Fiberoptic endoscopy is contraindicated in aneurysm of arch of aorta.

41. Ans. d. Acromegaly (Ref: Harrison 18/e p2894-2895)

Leprosy, Syphilis and Thalassemia causes depressed bridge of nose.

42. Ans. a. Sequestration crisis (Ref: Harrison 18/e p855)

43. Ans. c. Sir William Osler http://en.wikipedia.org/wiki/William_Osler

- Sir William Osler: "To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all"^Q

44. Ans. b Noise (Thrill/bruit)

45. Ans. c. Dense cortical bone

46. Ans. c. Vasomotor rhinitis www.ncbi.nlm.nih.gov/pubmed/16686388

- Vidian neurectomy is indicated in the cases of vasomotor rhinitis with profuse secretion refractory to conservative treatment^Q.

47. Ans. a. Carbon monoxide poisoning www.biomedsearch.com/searchlist.html?p=3101...txt=oxygen...

- Severe carbon monoxide poisoning treated by hyperbaric oxygen therapy^Q.

48. Ans. b. Tendinitis of common extensor origin (Ref: Bailey 25/e p495-496)

TENNIS ELBOW (LATERAL EPICONDYLITIS)

- This is the **most common cause of elbow pain** excluding traumatic conditions
- Usually occurs in patients of 30-50 years; Etiology is **unknown^Q** in most of cases
- **Strenuous or overactivity** may precede symptoms
- **Anterodistal lateral epicondyle tenderness^Q**

Diagnosis

- **Resisted wrist extension** is a reliable **diagnostic test^Q**
- **Local anesthetic injection** is **diagnostically helpful**

Treatment

- **Vast majority improve with supervised conservative management^Q**
- **Open or arthroscopic release** yields **good results in recalcitrant cases**
- **Arthroscopic release** also identifies associated pathology

49. Ans. d. Brunshwig operation medifactsonline.blogspot.com/2011/.../1000-eponyms-in-surgery

BRUNSHWIG OPERATION

- **Pelvic exenteration^Q**: Surgery to remove the lower colon, rectum and bladder, and create permanent stoma.

50. Ans. a. Always associated with breech extraction (Ref: Bailey 25/e p582)

TORTICOLLIS

- In torticollis the **head is tilted toward** and **rotated away from the tight sternocleidomastoid muscle**.
- **Congenital torticollis** is usually **secondary to intrauterine moulding** but may present with fixed **sternocleidomastoid contracture** or with a palpable mass in the muscle.
- **Most cases resolve with stretching** but, occasionally, **surgical release** of the sternocleidomastoid at one or both ends is needed.

51. Ans. d. Methylene blue en.wikipedia.org/wiki/Chromoendoscop

CHROMOENDOSCOPY

- **Chromoendoscopy**: Dyes are **instilled into the GIT** at the time of **visualization** with **fibre-optic endoscopy^Q**.
- **Chiefly enhance the characterization of tissues^Q**
- **Detail achieved can often allow for identification of the tissue type or pathology^Q**

Stains used

- **Absorptive stains** have an affinity for **particular mucosal elements**, and include **Lugol's iodine, methylene blue and gentian violet^Q**.

Lugol's iodine	<ul style="list-style-type: none"> • Specifically stains non-keratinized squamous epithelium^Q • Useful for identifying squamous tissue, squamous dysplasia and squamous cell carcinomas^Q.
Methylene blue	<ul style="list-style-type: none"> • Stains absorptive epithelium^Q • Useful for identifying abnormality in small intestine, colon and Barrett's esophagus^Q (intestinal metaplasia)

- **Contrast stains** are **not absorbed** but rather **provide contrast by permeating between irregularities in the mucosa to highlight irregularities**. The primary contrast stain is **indigo carmine^Q**.

- **Chief use of Indigo carmine: Identification of dysplastic cells in individuals with chronic UC^Q**.

- **Reactive stains** undergo an **observable change** due to a **chemical process** related to the function of the gastrointestinal tract. **Congo red** is used as a **test for achlorhydria in the stomach^Q**, as it changes **colour from red to black** at a pH less than 3.

Uses of Chromoendoscopy

- Identification of **squamous cell carcinomas or dysplasia** of the esophagus^Q
- Identification of **Barrett's esophagus and dysplasia^Q**
- identification of **early gastric cancer^Q**
- Characterization of **colonic polyps and colorectal cancer^Q**
- In **screening for dysplasia** in individuals with **ulcerative colitis^Q**.

52. Ans. c. T2 N0 M0 glottic cancer (Ref: Harrison 18/e p735)

- Concomitant chemoradiotherapy is indicated in advanced cancers of head and neck.^Q
- T2 N0 M0 glottic cancer represents stage II cancer which is defined as localized disease, which is not an indication for concomitant chemoradiotherapy.

53. Ans. None (Ref: Harrison 18/e p3561-3562)

Smoking may be associated with all of the above cancers.

Smoking Associated Cancers		
<ul style="list-style-type: none"> • Lung^Q • Nasopharynx, oropharynx hypopharynx and Larynx^Q • Nasal cavity and paranasal sinuses^Q 	<ul style="list-style-type: none"> • Oral cavity^Q • Esophagus^Q • Stomach^Q • Pancreas^Q • Liver^Q 	<ul style="list-style-type: none"> • Kidney^Q • Ureter and Urinary Bladder^Q • Uterine Cervix^Q • Acute Myeloid Leukemia

- Smoking is not associated with postmenopausal Breast cancer and endometrial cancer.

54. Ans. b. Neuroblastoma emedicine [medscape.com/article/439263-overview](https://www.medscape.com/article/439263-overview)

NEUROBLASTOMA

- Hutchinson and Pepper syndrome is skull metastasis seen in neuroblastoma^Q.

55. Ans. b. Ranula (Ref: Bailey 25/e p754)

56. Ans. a. Enzyme, b. Intra-operative histopathological examination, c. Fat, e. To check surgical margin in tumor surgery (Ref: Bailey 25/e p169-170; en.wikipedia.org/wiki/Histopathology)

FROZEN SECTION BIOPSY

- Biopsy technique in pathology laboratories for making urgent on-table diagnosis^Q
- Frozen section biopsy is a procedure done in a pathology setup existing adjacent to the operation theatre^Q.
- Surgeons are the main users of this service.

Procedure

- An unfixed fresh tissue is frozen (using CO₂ to -25°C) and section are made and stained.

Uses of Frozen Section Biopsy

- It is quick and surgeon can decide the further steps of procedure in the same sitting like nodal clearance/type of resection to be done.
- During surgery after resection of the tumor to look for (on table) the clearance in the margin and depth, also to study the lymph nodes for their positivity^Q.
- Used for demonstration of certain constituents which are lost in processing with alcohol or xylene, e.g., fat, enzymes^Q.

57. Ans. a. Pancreas cancer, c. Acute pancreatitis, d. Pancreatic divisum (Ref: Harrison 18/e p419)

PANNICULITIS

- Inflammatory lesions of the subcutaneous fat^Q
- Divided into the distinct categories:
 - Septal panniculitis: Inflammation is confined the interlobular septa of the subcutis
 - Lobular panniculitis: Inflammation involves the entire fat lobule and often the septa as well
 - Panniculitis secondary to vasculitis: Involve large vessels in the subcutis, in which the inflammation is usually restricted to the immediate vicinity of the involved vessel.
- Pancreatic panniculitis:
 - Manifests as painful or asymptomatic subcutaneous nodules or indurated plaques on the thighs, buttocks, lower trunk or distal extremities usually the lower.
 - Lesions are associated with acute pancreatitis^Q or less commonly, pancreatic carcinoma^Q either of which may be asymptomatic
 - It has also been associated with low grade pancreatitis in a patient with pancreas divisum^Q.

58. Ans. a. Modified sweat gland, c. Present in axilla and groin, d. Hidradenitis suppurativa is infection of apocrine gland (Ref: Bailey 25/e p1266; en.wikipedia.org/wiki/Apocrine_sweat_gland)

APOCRINE GLANDS

- An **apocrine sweat gland** is a modified **sweat gland**
- In humans, **apocrine sweat glands** are found only in certain locations of the body: **Axilla**, **areola** and **nipples** of the breast, **perianal region**, and some parts of the **external genitalia**.
- **Hidradenitis suppurativa** is **chronic suppurative condition** of apocrine glands bearing skin.

59. Ans. d. Carcinoma breast (Ref: Breast Pathology By Frances P O Malley (2006)/76-78)

CAUSES OF FAT NECROSIS

- After surgery/ surgical trauma: Wide local excision, Reduction mammoplasty^Q
- Following radiotherapy including iridium implants^Q
- Following trauma^Q
- Autologous fat injection^Q using the liposuction technique to fill in irregular contours and small soft tissue defects in the breast may lead to fat necrosis secondary to poor blood supply in the injected fat.

60. Ans. a. Formaldehyde (Ref: Surgical Pathology by Rosai and Ackermann 9/e p27)

FORMALIN

- Formaldehyde as a **buffered 10% aqueous solution (formalin^Q)** is the **fixative most commonly used in histology^Q**
- In routine clinical diagnostics it **offers the best possible compromise** between a **simple** and a **reliable method** as well as **extremely good structural preservation^Q**.

- The **strong cross-linking action** of formaldehyde is **essential**, to **protect the tissue from the aggressive effect of concentrated solvents** in the course of fixation and embedding in paraffin^Q.
- Fixation of tissue arrests the autolysis and putrefaction and stabilizes the cellular and tissue contents^Q

61. Ans. a. Aspergillus flavus (Ref: Ananthnarayan 7/e p625)

- **Primary Aflatoxin Producing Fungi: Aspergillus flavus^Q and Aspergillus parasiticus^Q**

62. Ans. d. Floor (Ref: BDC 4/e p1/58)

AXILLARY ABSCESS

- An **axillary abscess** is **incised through the floor^Q** of the axilla, midway between the anterior and posterior axillary folds, and nearer to the medial wall in order to **avoid injury to the main vessels running along the anterior, posterior and lateral walls**.

63. Ans. b. Tracheal stenosis (Ref: Dhillon 3/e p67)

- **Topical Mitomycin C** is the **drug of choice** used to aid the treatment of **laryngeal stenosis^Q**.
- **Topical Mitomycin C** can **inhibit fibroblast activity** and **restenosis^Q**.

64. Ans. a. 10% buffered neutral formalin

65. Ans. a. Sarcoidosis (Ref: Essentials of Chest Radiology by Janette Collins/165)

SARCOIDOSIS

- Sarcoidosis is a systemic disease characterized by **non-caseating granulomas in multiple organs**
- In **90% of cases**, **symmetrical massive bilateral hilar lymphadenopathy** occur
- The **cardiac border (Potato nodes)** or lung involvement is present and can be revealed by chest X-ray or transbronchial biopsy

66. Ans. a. Carcinoma

- "In normal persons, a click is felt when larynx is moved from side to side over vertebral column, this is called laryngeal click (post cricoid crepitus) It is absent in post cricoid carcinoma" — Moure's sign

67. Ans. b. Phenacetin - lung

IMAGE-BASED QUESTIONS

Image-based Questions

MULTIPLE CHOICE QUESTIONS

1. What is the name of instrument?

- a. Ovum forceps
- b. Sponge holding forceps
- c. Cord holding forceps
- d. Pile holding forceps



2. What is the name of instrument?

- a. Lister's sinus forceps
- b. Kocher's hemostatic forceps
- c. Babcock's tissue forceps
- d. Lane's tissue forceps



3. What is the name of instrument?

- a. Lister's sinus forceps
- b. Kocher's hemostatic forceps
- c. Babcock's tissue forceps
- d. Lane's tissue forceps



4. What are the uses of instrument?

- a. Used during laparotomy to retract skin margins
- b. Used to hold neck of bladder during bladder neck resection
- c. Used to hold skin flaps
- d. All of the above



5. What is the name of instrument?

- a. Lister's sinus forceps
- b. Kocher's hemostatic forceps
- c. Babcock's tissue forceps
- d. Lane's tissue forceps



6. What is the name of instrument?

- a. Lister's sinus forceps
- b. Kocher's hemostatic forceps
- c. Babcock's tissue forceps
- d. Lane's tissue forceps



7. What are the uses of instrument?

- a. Used to hold the cut skin margins during suturing
- b. Used to hold the linea alba or the rectus sheath during closure of abdominal incision
- c. Used to hold the scalp during closure of scalp incision
- d. All of the above



8. What is the name of instrument?

- a. Morris retractor
- b. Doyen's retractor
- c. Czerny's retractor
- d. Deaver's retractor



9. What is the name of instrument?

- a. Morris retractor
- b. Doyen's retractor
- c. Czerney's retractor
- d. Deaver's retractor



10. What are the uses of instrument?

- a. Used to retract skin flap for excision of sebaceous cyst
- b. Used during venesection for retraction of skin
- c. Used during tracheostomy for retraction of skin and thyroid isthmus
- d. All of the above



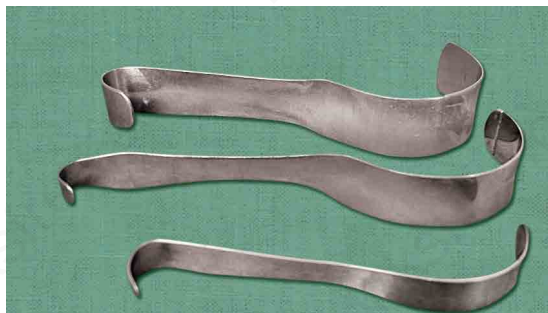
11. What is the name of instrument?

- a. Morris retractor
- b. Doyen's retractor
- c. Volkman's retractor
- d. Deaver's retractor



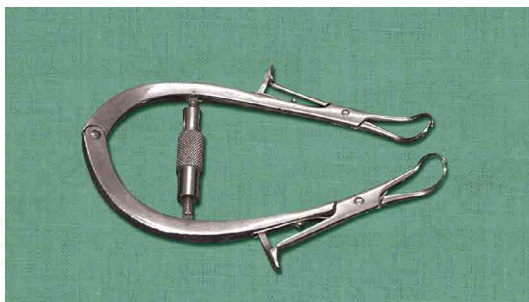
12. What is the name of instrument?

- a. Morris retractor
- b. Doyen's retractor
- c. Volkman's retractor
- d. Deaver's retractor



13. What is the name of instrument?

- a. Kocher's thyroid dissector
- b. Doyen's retractor
- c. Joll's thyroid retractor
- d. Deaver's retractor



14. What is the name of instrument?

- a. Kocher's thyroid dissector
- b. Doyen's retractor
- c. Joll's thyroid retractor
- d. Deaver's retractor



15. What is the name of instrument?

- a. Ovum forceps
- b. Sponge holding forceps
- c. Cord holding forceps
- d. Pile holding forceps



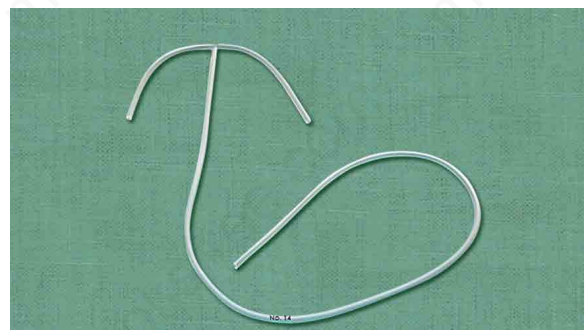
16. What is the name of instrument?

- a. Pyelolithotomy forceps
- b. Sponge holding forceps
- c. Desjardins forceps
- d. Pile holding forceps



17. What is the name of tube?

- a. Kocher's T-tube
- b. Kehr's T-tube
- c. Lanz T-tube
- d. Mayo's T-tube



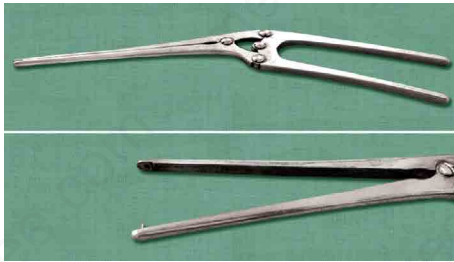
18. What is the name of instrument?

- a. Payr's crushing clamp
- b. Doyen's intestinal occlusion clamp
- c. Hemostatic clamp
- d. Vascular clamp



19. What is the name of instrument?

- a. Payr's crushing clamp
- b. Doyen's intestinal occlusion clamp
- c. Hemostatic clamp
- d. Vascular clamp



20. What is the name of instrument?

- a. Pyelolithotomy forceps
- b. Sponge holding forceps
- c. Sprapubic cystolithotomy forceps
- d. Pile holding forceps



21. What is the name of instrument?

- a. Pyelolithotomy forceps
- b. Sponge holding forceps
- c. Sprapubic cystolithotomy forceps
- d. Pile holding forceps



22. What is the name of instrument?

- a. Doyen's retractor
- b. Doyen's intestinal occlusion clamp
- c. Doyen's mouth gag
- d. Joll's thyroid retractor



23. What is the name of instrument?

- a. Aneurysm needle
- b. Cervical dilator
- c. Tracheal dilator
- d. Urethral dilator



24. What is the name of instrument?

- a. Aneurysm needle
- b. Veress needle
- c. Tracheal dilator
- d. Urethral dilator



25. What is the name of instrument?

- a. Aneurysm needle
- b. Veress needle
- c. Tracheal dilator
- d. Urethral dilator



26. What is the name of instrument?

- a. Doyen's towel clip
- b. Mayo's towel clip
- c. Moynihan's tetra towel clip
- d. Lanes tissue forceps



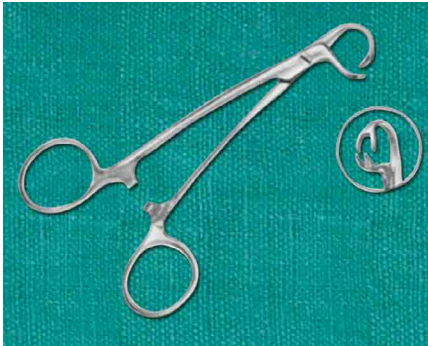
27. What is the name of instrument?

- a. Doyen's towel clip
- b. Mayo's towel clip
- c. Moynihan's tetra towel clip
- d. Lanes tissue forceps



28. What is the name of instrument?

- a. Doyen's towel clip
- b. Mayo's towel clip
- c. Moynihan's tetra towel clip
- d. Lanes tissue forceps



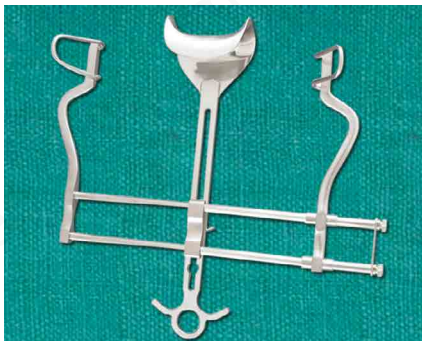
29. What is the name of instrument?

- a. Doyen's towel clip
- b. Bone curette
- c. Aneurysm needle
- d. Doyen's coastal elevator



30. What is the name of instrument?

- a. Morris retractor
- b. Volkman's retractor
- c. Doyen's retractor
- d. Balfours retractor



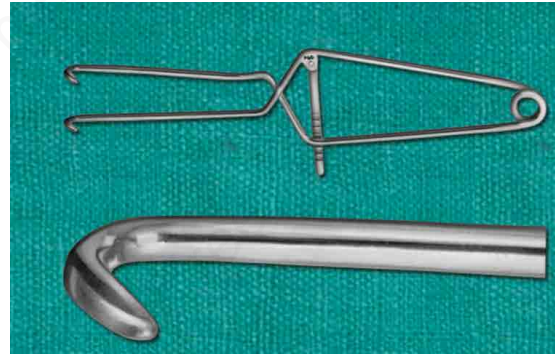
31. What is the name of instrument?

- a. Doyen's mouth gag
- b. Beckman Weitlaner retractor
- c. Cat's paw retractor
- d. Bladder neck retractor



32. What is the use of instrument?

- a. Retracting skin flaps in thyroid surgery
- b. Opening mouth in oral surgery
- c. Retracting skin in grafting
- d. Retracting bladder neck



33. What is the use of instrument?

- a. Dissection in thyroid surgeries
- b. Elevation of periosteum
- c. Suturing
- d. Used with blade for skin incision



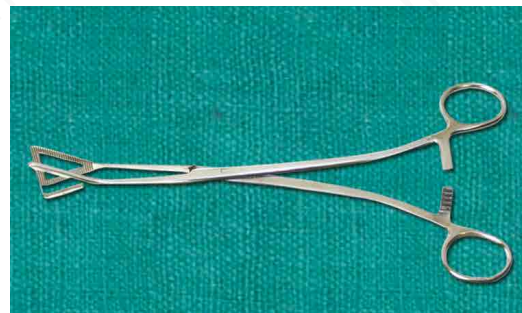
34. What is the use of instrument?

- a. Used for blunt dissections
- b. Used to clean abscess cavity
- c. Used to hold sponge during cleaning and draping
- d. Used to pick sterilized instruments



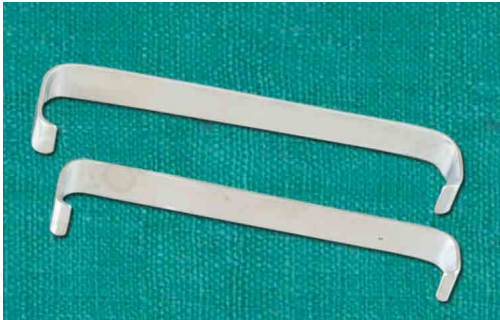
35. What is the name of instrument?

- a. Rampley's sponge holding forceps
- b. Piles holding forceps
- c. Duval lung holding forceps
- d. Ovum holding forceps



36. What is the name of instrument?

- a. Morris retractor
- b. Farabeuf retractor
- c. Doyen's retractor
- d. Volkman's retractor



37. What is the use of instrument?

- a. Elevation of periosteum
- b. Cutting the bone
- c. Harvesting skin graft
- d. Retraction of abdominal wall



38. What is the name of instrument?

- a. Satinsky vascular clamp
- b. Light bulldog clamp
- c. Pott's bulldog clamp
- d. Well's arterial clamp



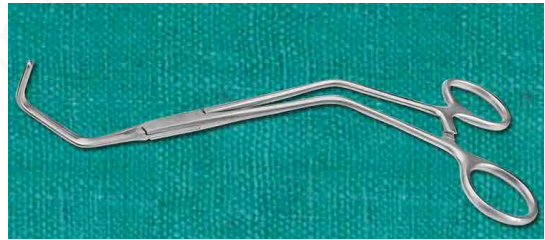
39. What is the name of instrument?

- a. Satinsky vascular clamp
- b. Light bulldog clamp
- c. Pott's bulldog clamp
- d. Well's arterial clamp



40. What is the name of instrument?

- a. Satinsky vascular clamp
- b. Light bulldog clamp
- c. Pott's bulldog clamp
- d. Well's arterial clamp



41. What is the name of instrument?

- a. Mayo scissors
- b. Metzenbaum scissors
- c. Mcindoe scissors
- d. None of the above



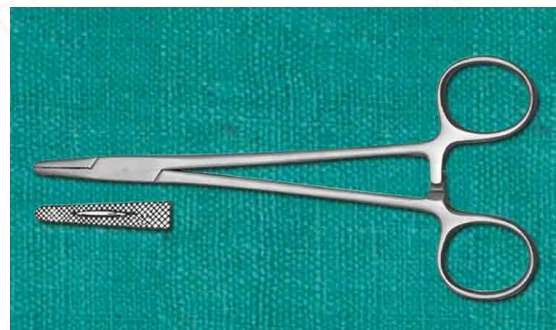
42. What is the name of instrument?

- a. Mayo scissors
- b. Metzenbaum scissors
- c. Mcindoe scissors
- d. None of the above



43. What is the name of instrument?

- a. Artery forceps
- b. Needle holder
- c. Kochers forceps
- d. Tissue forceps



44. What is the name of instrument?

- a. Rampley's sponge holding forceps
- b. Piles holding forceps
- c. Duval lung holding forceps
- d. Ovum forceps



45. What is the name of instrument?

- a. Lister sinus forceps
- b. Lanes tissue forceps
- c. Russian tissue forceps
- d. Kocher's forceps



46. What is the name of instrument?

- a. Kocher's forceps
- b. Right angle forceps
- c. Lanes tissue forceps
- d. Russian tissue forceps



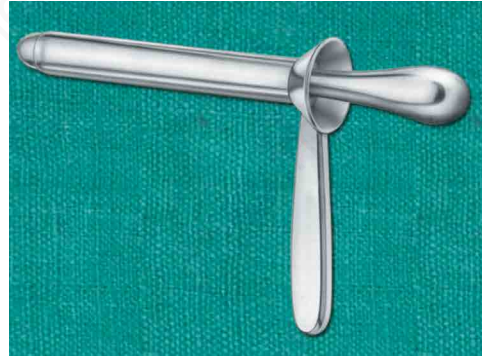
47. What is the name of instrument?

- a. Osteotome
- b. Bone cutter
- c. Bone nibbler
- d. Rib shear



48. What is the name of instrument?

- a. Anal dilator
- b. Cusco speculum
- c. Proctoscope
- d. Sigmoidoscope



49. What is the name of instrument?

- a. Bone hook
- b. Bone curette
- c. Periosteal elevator
- d. Kocher's dissector



50. What is the name of instrument?

- a. Liver retractor
- b. Rib retractor
- c. Scapula retractor
- d. Abdominal wall retractor



51. What is the name of instrument?

- a. Czerny's retractor
- b. Morris retractor
- c. Langenbeck's retractor
- d. Doyen's retractor



52. What is the name of instrument?

- a. Cervical dilator
- b. Urethral dilator
- c. Esophageal dilator
- d. Anal dilator



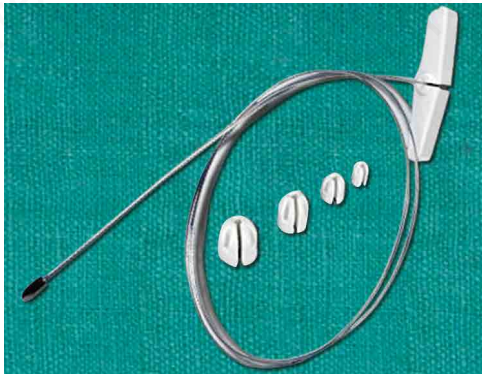
53. What is the name of instrument?

- a. Bile duct dilator
- b. Ureteric dilator
- c. Urethral dilator
- d. Cervical dilator



54. What is the name of instrument?

- a. Gigli saw
- b. Mayo's vein stripper
- c. Fogarty balloon catheter
- d. Long intravenous catheter



55. What is the name of instrument?

- a. Gigli saw
- b. Mayo's vein stripper
- c. Fogarty balloon catheter
- d. Long intravenous catheter



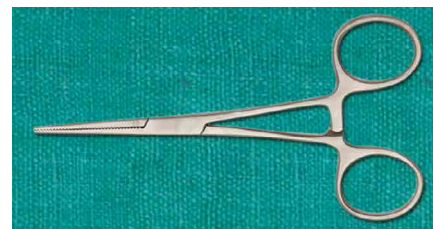
56. What is the name of instrument?

- a. Mosquito hemostatic forceps
- b. Spencer Wells hemostatic forceps
- c. Kocher's hemostatic forceps
- d. Right angle forceps

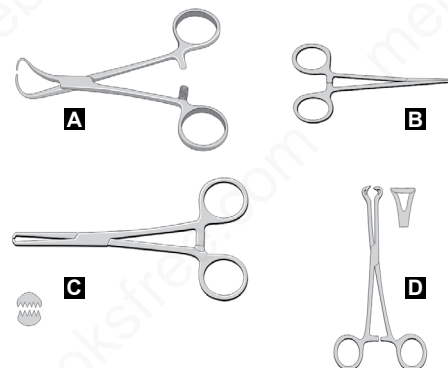


57. What is the name of instrument?

- a. Mosquito hemostatic forceps
- b. Spencer Wells hemostatic forceps
- c. Kocher's hemostatic forceps
- d. Right angle forceps



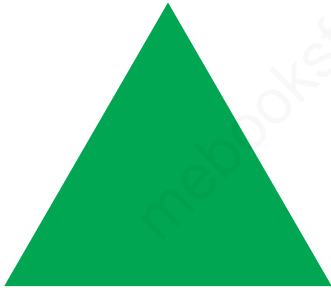
58. Identify the instruments shown here and choose the best combination:
(APPG 2016)



- a. A = Dunhill's forceps. B = Halstead mosquito forceps. C = Allis forceps. D = Crile's hemostatic forceps
- b. A = Crile's hemostatic forceps. B = Allis intestinal forceps. C = Schmidt tonsil forceps. D = Babcock intestinal forceps
- c. A = Backhaus towel clamp. B = Halstead mosquito forceps. C = Allis forceps. D = Babcock intestinal forceps
- d. A = Backhaus towel clamp. B = Foerster sponge forceps. C = Dunhill's forceps. D = DeBakey forceps

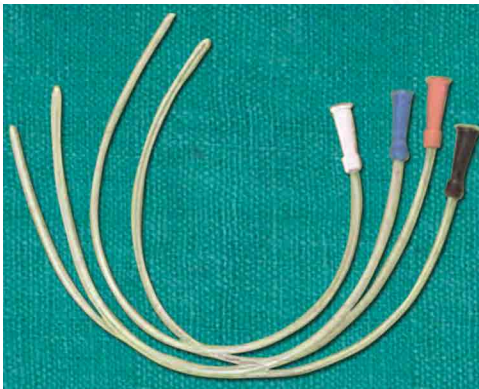
59. The given needle symbol represents:

- a. Taper point needle
- b. Blunt taper point needle
- c. Cutting edge needle
- d. Reverse cutting edge needle



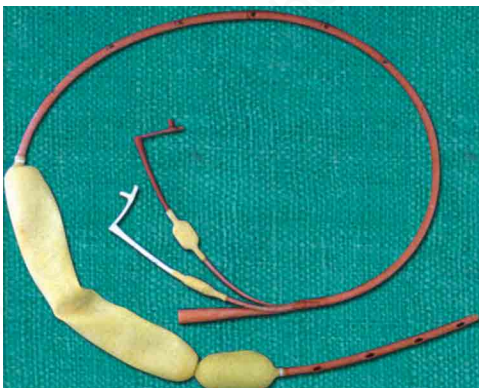
60. What is the name of catheter?

- a. Nelaton catheter
- b. Fogarty catheter
- c. Infant feeding tube
- d. Ryles tube



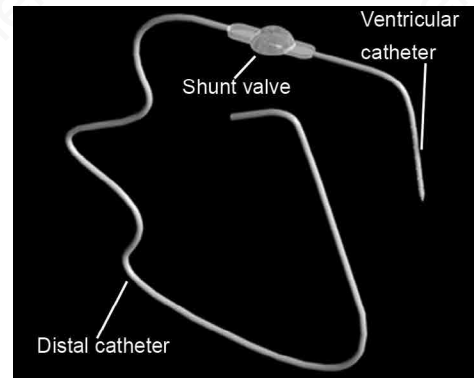
61. What is the name of tube/catheter?

- a. Nelaton's catheter
- b. Fogarty catheter
- c. Sengstaken Blakemore tube
- d. Bladder irrigation catheter



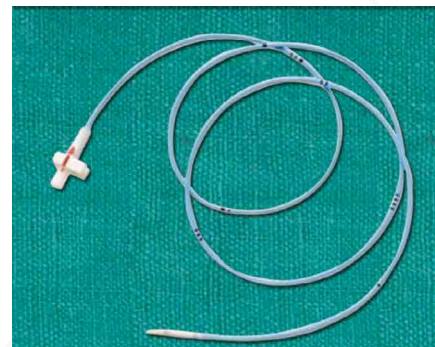
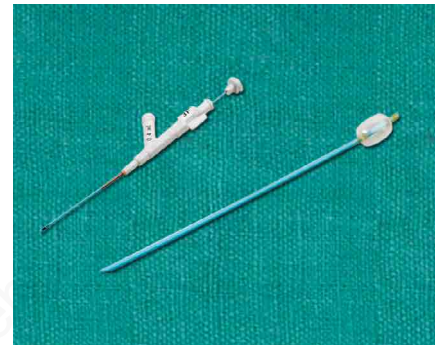
62. This tube/catheter is used in:

- a. Portocaval shunt
- b. Peritoneovenous shunt
- c. Mesocaval shunt
- d. Ventriculoperitoneal shunt



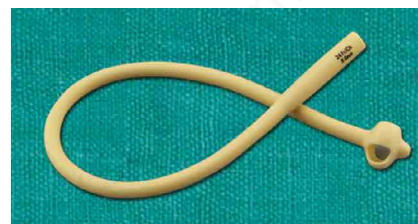
63. What is the name of tube/catheter?

- a. Nelaton's catheter
- b. Fogarty catheter
- c. Sengstaken Blakemore tube
- d. Bladder irrigation catheter



64. What is the name of catheter?

- a. Nelaton catheter
- b. Fogarty catheter
- c. Foley's catheter
- d. Malecot's catheter



65. This characteristic appearance is seen on IVP in:

- a. Tuberculosis
- b. VUR
- c. Ureterocele
- d. Ureteric stone



66. On barium enema, this appearance is seen in:

- a. Ischemic colitis
- b. Carcinoma colon
- c. Colonic diverticula
- d. Colonic polyposis



67. Above mentioned ERCP is highly suggestive of:

- a. Acute pancreatitis
- b. Chronic pancreatitis
- c. Carcinoma pancreas
- d. Cholangiocarcinoma



68. A 10 years old female preseneted with recurrent attacks of cholangitis. CECT was done, the diagnosis on the basis of CECT is:

- a. Type 1 choledochal cyst
- b. Type 3 choledochal cyst
- c. Type 4 choledochal cyst
- d. Type 5 choledochal cyst



69. This characteristic appearance is seen on barium swallow in:

- a. Achalasia cardia
- b. Nutcrackers esophagus
- c. Diffuse esophageal spasm
- d. Hypertensive LES



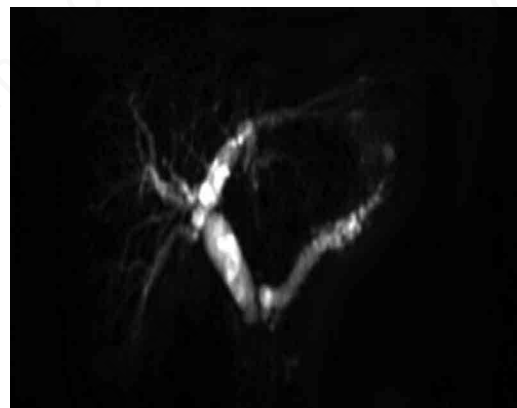
70. This incidental finding on ultrasound abdomen is suggestive of:

- a. Gall bladder stone
- b. Gall bladder polyp
- c. Adenomyomatosis
- d. Xanthogranulomatous cholecystitis



71. A 60-year old chronic smoker presented with jaundice, anorexia and weight loss. ERCP was done. The diagnosis on the basis of ERCP findings:

- a. Choledochal cyst
- b. Cholangiocarcinoma
- c. Carcinoma pancreas
- d. Chronic pancreatitis



72. This characteristic appearance is seen on barium enema in:

- a. Colonic polyps
- b. Colonic diverticula
- c. Ischemic colitis
- d. Carcinoma colon



73. This characteristic appearance is seen in:

- a. Gastric volvulus
- b. Small intestinal volvulus
- c. Cecal volvulus
- d. Sigmoid volvulus



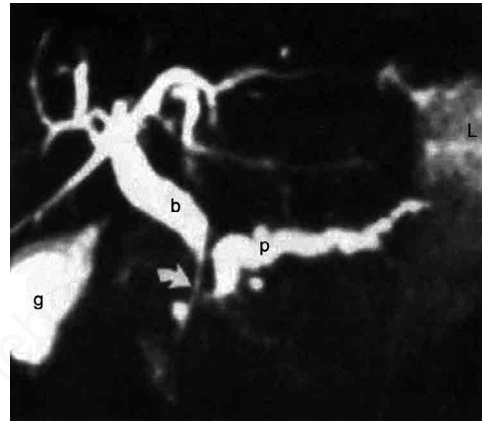
74. This characteristic appearance is seen on barium swallow in:

- a. Achalasia cardia
- b. Carcinoma esophagus
- c. Leiomyoma
- d. Diffuse esophageal spasm



75. A 60-year-old male shambhu presented with painless progressive jaundice. On examination, gall bladder was palpable. MRCP image is given. On the basis of findings of MRCP, most probable diagnosis is:

- a. Hilar cholangiocarcinoma
- b. Distal cholangiocarcinoma
- c. Carcinoma gall bladder
- d. Carcinoma pancreas



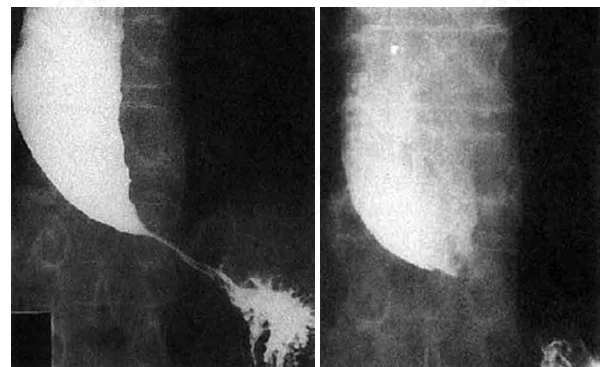
76. Incidental finding in a female patient of age 56 years who underwent the CECT abdomen is suggestive of:

- a. Carcinoma gall bladder
- b. Gallbladder polyp
- c. Porcelain gall bladder
- d. Gall stone



77. This characteristic appearance is seen on barium swallow in:

- a. Carcinoma esophagus
- b. Achalasia cardia
- c. Nutcracker's esophagus
- d. Diffuse esophageal spasm



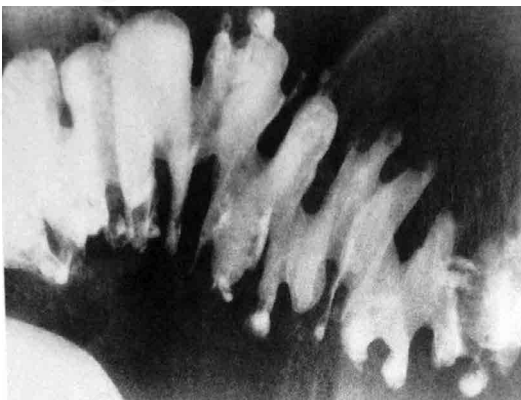
78. This characteristic appearance is seen in:

- Duodenal adenocarcinoma
- Distal cholangiocarcinoma
- Ampullary carcinoma
- Carcinoma head of pancreas



79. This characteristic appearance is seen on barium enema in:

- Colonic polyps
- Colonic diverticula
- Carcinoma colon
- Ischemic colitis



80. This characteristic appearance is seen in:

- Gastric volvulus
- Small intestinal volvulus
- Cecal volvulus
- Sigmoid volvulus



81. Ramesh, 30-year-old male presented with repeated attacks of renal colics. X-ray KUB was done. Findings are suggestive of:

- Calcium oxalate stone
- Uric acid stone
- Struvite stone
- Cystine stone

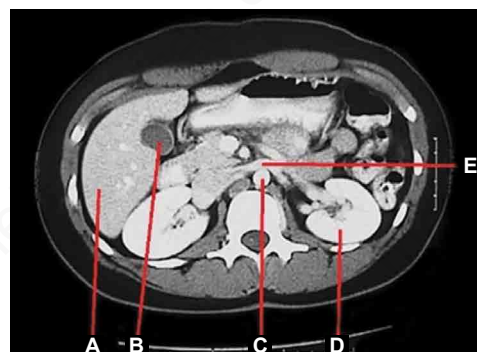


82. A 10 months old child was brought to your hospital having recurrent attacks of pain abdomen. On examination, sausage shaped mass was palpable in the right lumbar region. Barium enema was done. What is the diagnosis on the basis of barium enema findings?

- Colorectal polyp
- Rectal prolapse
- Intussusception
- Carcinoma colon



83. Identify the labelled structures in the CT abdomen here: (APPG 2016)



- A = liver, B = inferior vena cava, C = head of pancreas, D = left kidney, E = transverse colon
- A = right kidney, B = gallbladder, C = aorta, D = stomach, E = pancreas
- A = right kidney, B = inferior vena cava, C = head of pancreas, D = left psoas muscle, E = transverse colon
- A = liver, B = gall bladder, C = aorta, D = left kidney, E = pancreas

84. In a patient of pseudomembranous colitis, CECT was done. What is the name of sign seen on CECT?

- a. Accordion sign
- b. Whorl sign
- c. Central stellate scar
- d. Honeycombing



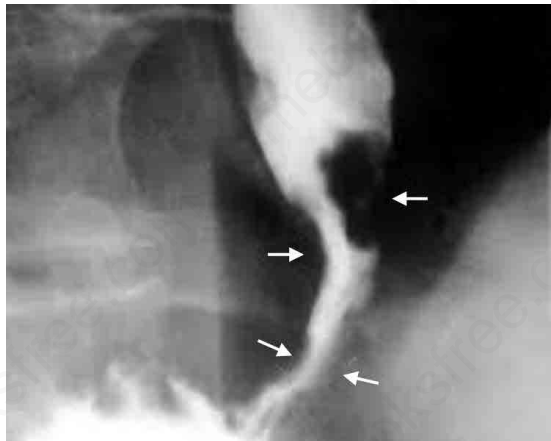
85. What is the diagnosis on the basis of CECT findings?

- a. ADPKD
- b. Bilateral RCC with multiple liver metastasis
- c. Multiple secondaries with unknown primary
- d. HCC with multiple metastasis to kidneys



86. A 60-year-old chronic smoker presented with progressive dysphagia. Barium swallow was done, what is the name of sign?

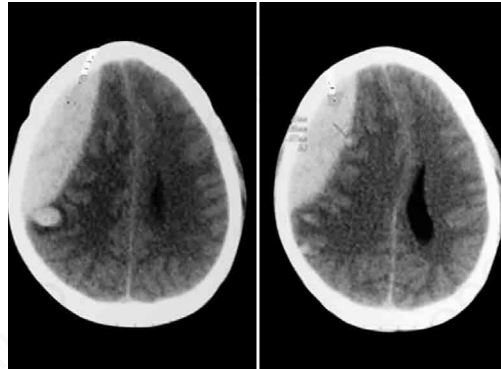
- a. Bird beak appearance
- b. Pencil tip appearance
- c. Apple core appearance
- d. Rat tail appearance



87. This is the plain CT scan of a male who sustained an injury with a baseball bat. Which of the following statements are TRUE regarding this condition?

- P. Middle meningeal artery is the vessel commonly injured
- Q. usually occurs several weeks after a trivial injury, often forgotten
- R. lucid interval is classical but seen only in 1/5 to 1/3 patients
- S. may be associated with a Hutchinsonian pupil:

(APPG 2016)



- a. Only P, R are correct
- b. Only P, R, S are correct
- c. Only Q, R, S are correct
- d. P, Q, R, S all are correct

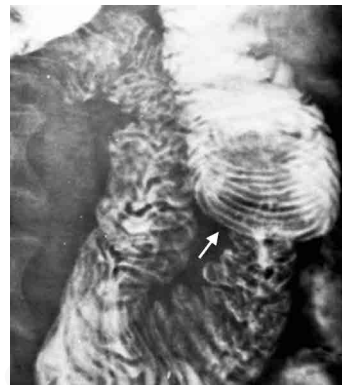
88. IVP was done in a patient having hypercalcemia and nephrolithiasis. What is the diagnosis based on IVP findings?

- a. ADPKD
- b. ARPKD
- c. Medullary sponge kidney
- d. Congenital Cystic nephroma



89. What is the name of sign in this barium enema done in the patient of intussusception?

- a. Meniscus sign
- b. Claw sign
- c. Coiled spring sign
- d. Target sign



90. A patient presented to the emergency with pain in epigastrium radiating to left back. X-ray abdomen was done. The finding seen in the X-ray is:

- a. Sentinel loop
- b. Colon cut off sign
- c. Renal Halo sign
- d. Ground glass appearance



91. An infant after four weeks of birth was brought with the history multiple episodes of nonbilious projectile vomiting. X-ray abdomen was done. What is the diagnosis?

- a. Duodenal atresia
- b. Jejunal atresia
- c. Ileal atresia
- d. Hypertrophic pyloric stenosis



92. A newborn baby was brought with the history multiple episodes of bilious projectile vomiting. X-ray abdomen was done. What is the diagnosis?

- a. Duodenal atresia
- b. Jejunal atresia
- c. Ileal atresia
- d. Hypertrophic pyloric stenosis



93. A newborn baby was brought with the history multiple episodes of bilious projectile vomiting. X-ray abdomen was done. What is the diagnosis?

- a. Duodenal atresia
- b. Jejunal atresia
- c. Ileal atresia
- d. Hypertrophic pyloric stenosis



94. What is the diagnosis based on IVP findings?

- a. VUR
- b. ADPKD
- c. Ectopic ureteric orifice
- d. Ureterocele



95. This patient came with acute dyspnea. Which of the following statements is TRUE? (APPG 2016)



- a. It is due to old tuberculosis and fibrosis of left lung
- b. X-ray shows Westermark's sign on right side
- c. A needle should be inserted into the chest wall in the second right intercostal space as an emergency
- d. He needs emergency bronchoscopy to remove possible FB in left side

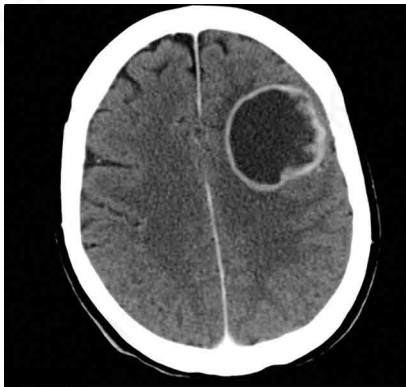
96. A 40-year-old female presented with weakness of lower limbs with bladder dysfunction. On the basis of MRI findings, what is the diagnosis?

- Astrocytoma
- Meningioma
- Pituitary adenoma
- Oligodendroglioma



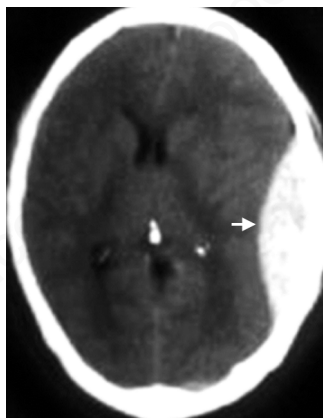
97. A 25-year-old male presented with morning headache, projectile vomiting and seizures. MRI was done. What is the diagnosis on the basis of radiological findings?

- Meningioma
- Glioblastoma
- Medulloblastoma
- Oligodendroglioma



98. A 25 years old male was brought to casualty with history of RTA. NCCT was done. What is the diagnosis?

- EDH
- SDH
- Subarachnoid hemorrhage
- None of the above



99. A 65 years old male was brought to casualty with history of RTA. NCCT was done. What is the diagnosis?

- EDH
- SDH
- Subarachnoid hemorrhage
- None of the above



100. Given radiological sign is seen in:

- PUJ obstruction
- Aberrant left renal artery
- Retrocaval ureter
- Retroperitoneal fibrosis



101. A 40-year-old male was brought to the casualty with history of RTA. Cystography was done. What is the name of sign seen in the image?

- Pear sign
- Flame sign
- Tear drop bladder
- Rim sign



102. A 40-year-old male was brought to the casualty with history RTA. Cystography was done. What is the name of sign seen in the image?

- a. Pear sign
- b. Flame sign
- c. Tear drop bladder
- d. Rim sign



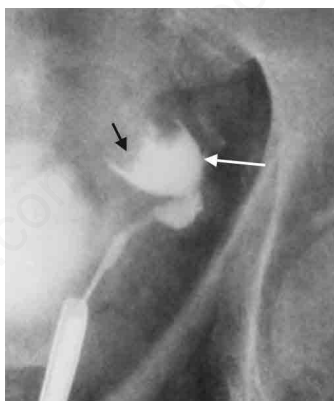
103. A 40-year-old male was brought to the casualty with history RTA. Cystography was done. What is the name of sign seen in the image?

- a. Pear sign
- b. Flame sign
- c. Tear drop bladder
- d. Rim sign



104. In a chronic smoker, who presented with hematuria, RGP was performed as patient was having carcinoma renal pelvis. What is the name of sign seen on this film?

- a. Bergman sign
- b. Stipple sign
- c. Goblet sign
- d. Both B and C



105. A 40 years old male was brought to the emergency with the history of multiple episodes of colicky pain, bilious vomiting with no passage of feces and flatus. X-ray abdomen was done. On the basis of findings, what is the diagnosis?

- a. Duodenal obstruction
- b. Jejunal obstruction
- c. Ileal obstruction
- d. Colonic obstruction



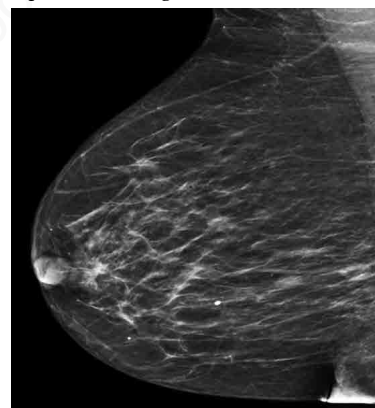
106. A 60-year-old male presented with painless, compressible swelling in right side of neck. What is the diagnosis on the basis of given image findings?

- a. Branchial cyst
- b. Cystic hygroma
- c. Chemodectoma
- d. Branchial fistula



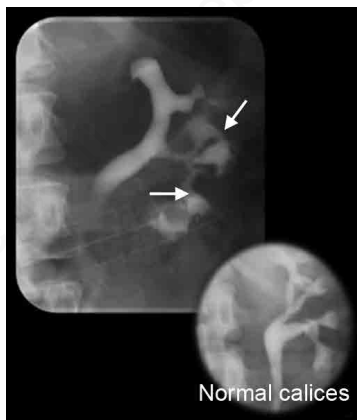
107. Mammography was performed in 45 years old female for screening of breast cancer. The finding is suggestive of:

- a. Benign lesion
- b. Malignant lesion
- c. Indeterminate
- d. No opinion can be given



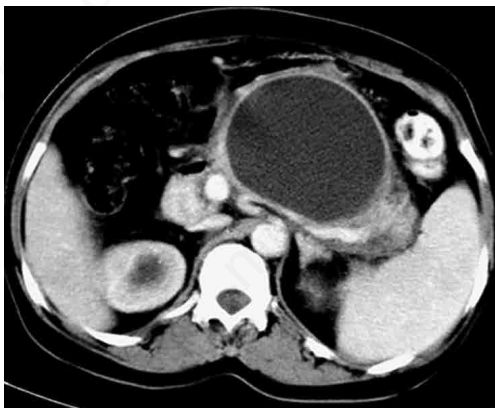
108. **Earliest sign of renal tuberculosis on IVP:**

- a. Caliectasis
- b. Moth eaten calyx
- c. Splaying of calyces
- d. Hydronephrosis



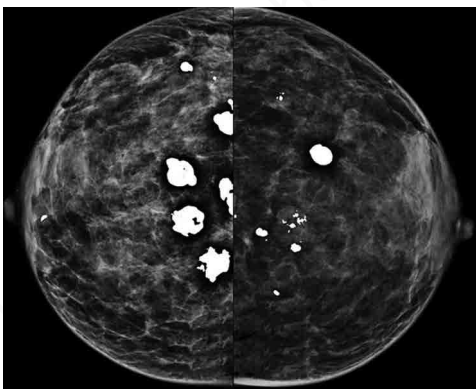
109. **A chronic alcoholic presented with repeated episodes of nonbilious vomiting after meals. On the basis of CECT findings, what is the diagnosis?**

- a. Gastric outlet obstruction
- b. Pseudocyst
- c. Carcinoma pancreas
- d. Chronic pancreatitis



110. **A young female came to the surgery OPD with bilateral breast mass. On examination, mass was firm and mobile. What is the diagnosis on the basis of findings?**

- a. Breast cyst
- b. Fibroadenoma
- c. DCIS
- d. LCIS



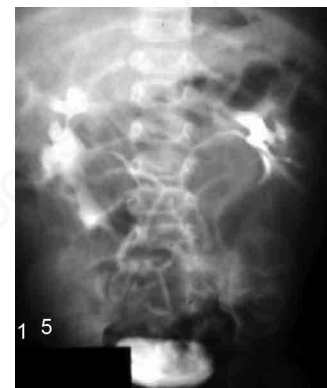
111. **What is the name of radiological sign seen in a patient with history of renal stones?**

- a. Cup sign
- b. Honeycombing
- c. Egg in cup appearance
- d. Rim sign



112. **IVP was done in the patient of ADPKD. What is the name of this sign?**

- a. Spider leg appearance
- b. Swiss cheese appearance
- c. Bubble appearance
- d. Bristles of brush appearance



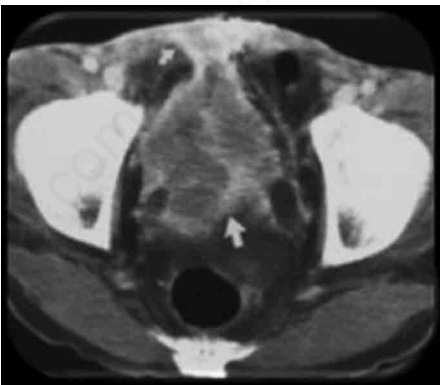
113. **Kalu, 35-year-old male presented with the history of recurrent attacks of colicky abdominal pain. Barium meal follow through was done. What is the name of this radiological sign?**

- a. String sign of Kantor
- b. Goose neck appearance
- c. Fleishners sign
- d. Umbrella sign



114. In a patient of genitourinary tuberculosis, IVP was done. What is the name of the sign seen in the image?

- a. Moth eaten calyx
- b. Pipe stem ureter
- c. Bladder calcification
- d. Thimble bladder



115. A 5-year-old child was brought with history of recurrent UTI, fever and abdominal pain. MCU was done. What is the diagnosis based on the given image?

- a. Grade II VUR
- b. Grade III VUR
- c. Grade IV VUR
- d. Grade V VUR



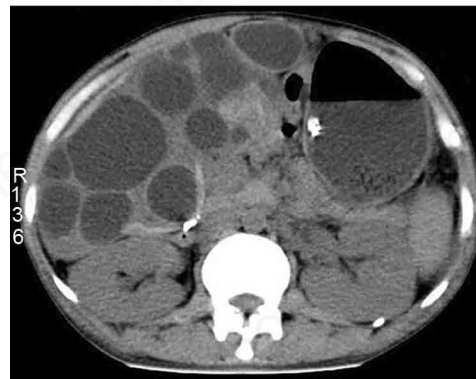
116. A 60-year-old diabetic male patient presented to the OPD with halitosis and dysphagia. Barium swallow was done. What is the diagnosis based on the given findings?

- a. Achalasia cardia
- b. Carcinoma esophagus
- c. Zenker's diverticulum
- d. Leiomyoma



117. A 40-year-old female presented with abdominal discomfort, dyspepsia and palpable abdominal mass. USG and CECT was performed. What is the diagnosis based on this ultrasound image?

- a. Hydatid cyst
- b. Multiple HCC
- c. Liver secondaries
- d. Polycystic liver disease



118. What is the diagnosis based on this ultrasound image?

- a. Simple hepatic cyst
- b. HCC
- c. Liver secondaries
- d. Intrahepatic cholangiocarcinoma



119. What is the diagnosis based on this ultrasound image?

- a. Gall stone
- b. Gall bladder polyp
- c. Porcelain gall bladder
- d. Adenomyomatosis



120. X-ray of newborn with inability to pass stools. What is the name of this study? *(Recent Question 2015)*

- a. Invertogram
- b. Enteroclysis
- c. Graham Cole test
- d. Digital X-ray



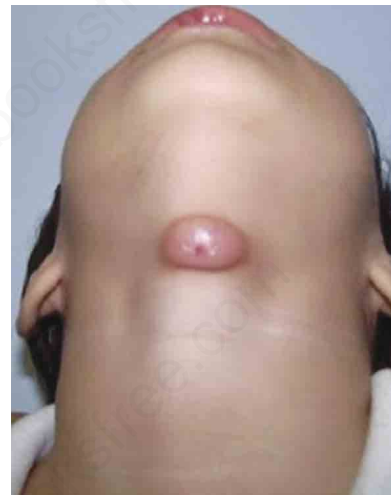
121. Gross appearance of gallbladder specimen is suggestive of:

- a. Emphysematous cholecystitis
- b. Xanthogranulomatous cholecystitis
- c. Gallbladder cholesterosis
- d. Adenomyomatosis



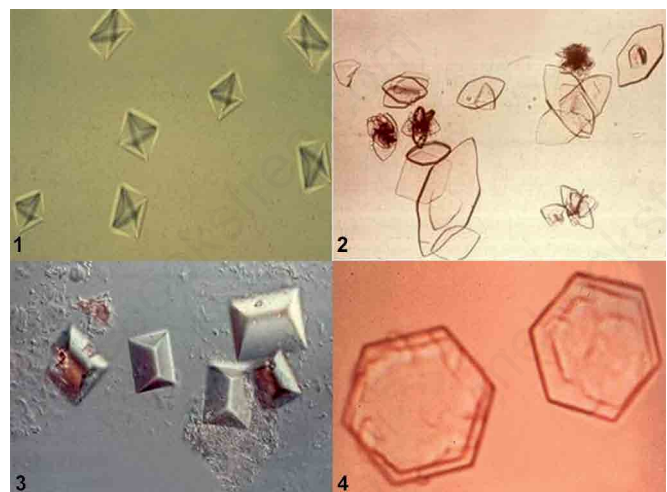
122. A 10-year-old child presented with midline swelling in anterior position of neck. Most probable diagnosis is:

- a. Thyroglossal cyst
- b. Thyroglossal fistula
- c. Cold abscess
- d. Acute lymphadenitis



123. Correct order of stones on the basis of images of crystals:

- a. Calcium oxalate, struvite, uric acid, cystine
- b. Calcium oxalate, uric acid, struvite, cystine
- c. Uric acid, calcium oxalate, struvite, cystine
- d. Struvite, uric acid, calcium oxalate cystine



124. Identify these two surgical instruments:

(APPG 2015)

- a. Sponge holder and Allis forceps
- b. Needle holder and ovum forceps
- c. Thumb forceps and Sponge holder
- d. Artery forceps and needle holder



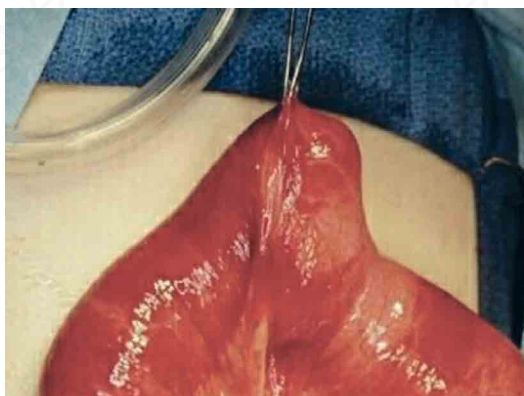
125. What is the diagnosis of barium esophagogram? (APPG 2015)

- a. Achalasia cardia
- b. Hiatus hernia
- c. Diffuse esophageal spasm
- d. Reflux esophagitis



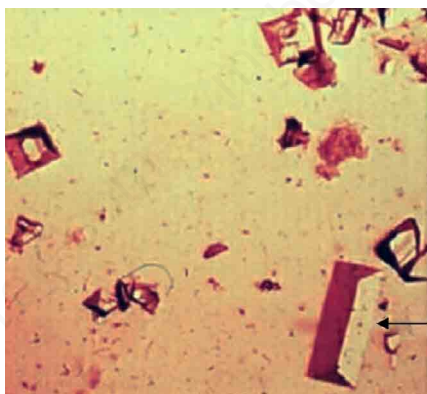
126. What does the intraoperative photograph above depicts? (APPG 2015)

- a. Transverse colon
- b. Fallopian tube
- c. Meckels diverticulum
- d. Intussusception



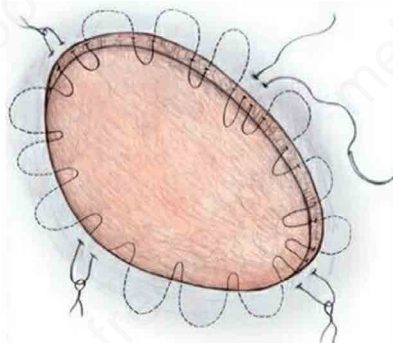
127. Identify the crystals depicted in urine microscopy:

- a. Oxalate crystals
- b. Cystine crystals
- c. Struvite crystals
- d. Uric acid crystals



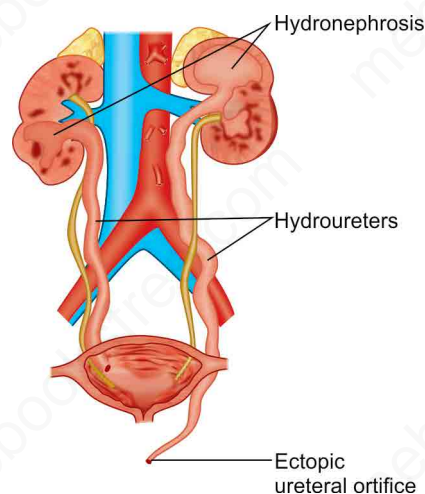
128. What type of suture is this? (APPG 2015)

- a. Purse string suture
- b. Halsted's suture
- c. Pare suture
- d. Mattress interrupted sutures



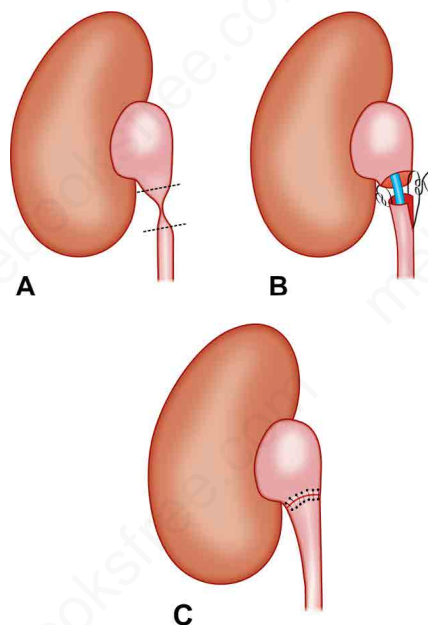
129. Given diagram represent which rule?

- a. Weigert-Meyers rule
- b. Pascal's rule
- c. Lambert's rule
- d. Beer's rule



130. This surgery is performed for which of the following condition?

- a. Carcinoma renal pelvis
- b. PUJ obstruction
- c. Ureteric strictures
- d. VUR



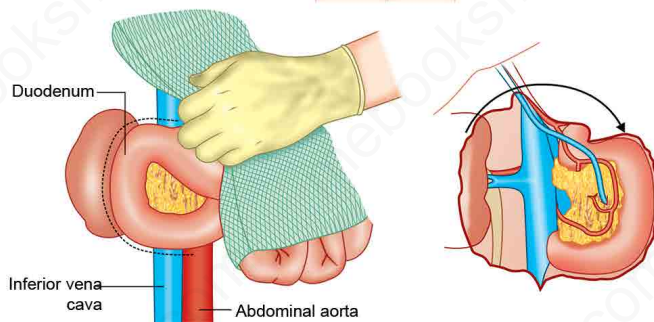
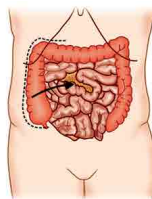
131. A 40-year-old male, who is a chronic smoker presented with long history of intermittent claudication and blackish discoloration of toes. What is the preferred treatment?

- Abstinence from smoking only
- Vasodilators
- Lumbar sympathectomy
- Amputation



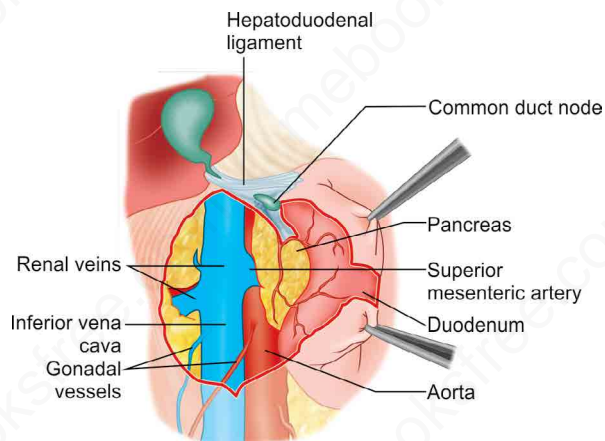
132. What is the name of this manuever?

- Mattox manuever
- Kocher's manuever
- Extended Kochers manuever
- Cattel-Braasch manuever



133. What is the name of this manuever?

- Mattox manuever
- Kocher's manuever
- Extended Kochers manuever
- Cattel-Braasch manuever



134. This is the image of a newborn baby. The swelling is:

- Transilluminant
- Brilliantly transilluminant
- Translucent
- Brilliantly Translucent



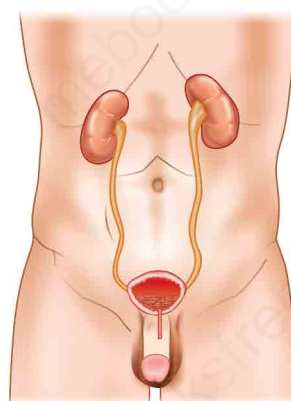
135. What is the diagnosis based on the given image?

- Gastroschisis
- Omphalocele
- Umbilical hernia
- Ectopia vesicae



136. What is the name of this intervention performed frequently for renal stone removal?

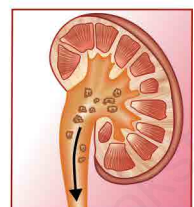
- ESWL
- PCNL
- Ureteroscopy
- Laparoscopic stone surgery



Shock waves
break up
kidney stones

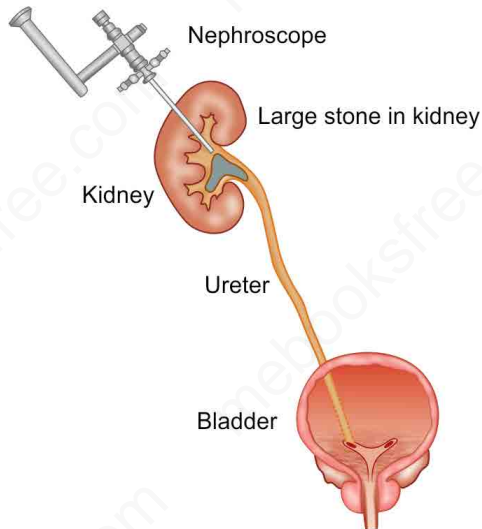


Small pieces
pass through
urinary tract



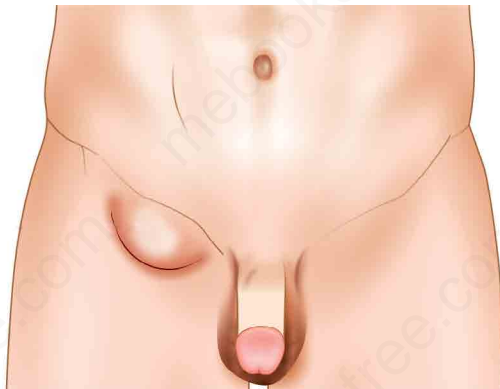
137. What is the name of this intervention performed frequently for renal stone removal?

- a. ESWL
- b. PCNL
- c. Ureteroscopy
- d. Laparoscopic stone surgery



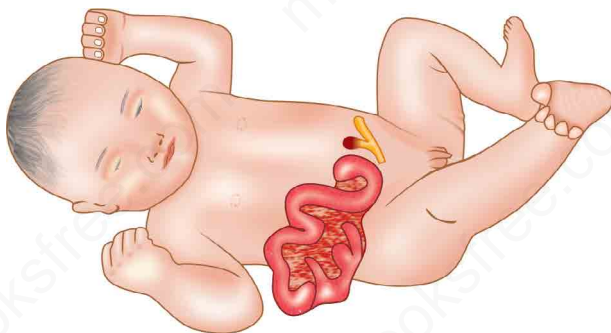
138. What is the type of hernia?

- a. Direct inguinal hernia
- b. Indirect inguinal hernia
- c. Femoral hernia
- d. Obturator hernia



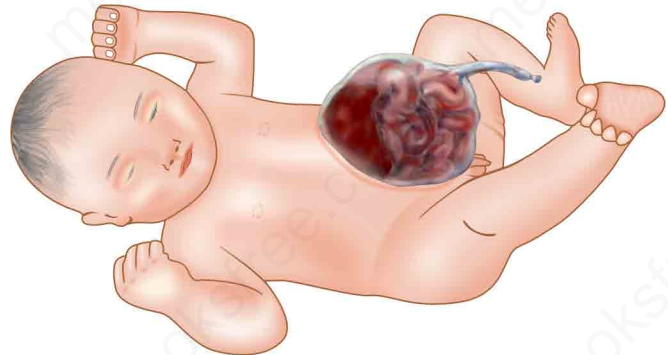
139. What is the diagnosis based on the given image?

- a. Gastroschisis
- b. Omphalocele
- c. Umbilical hernia
- d. Ectopia vesicae



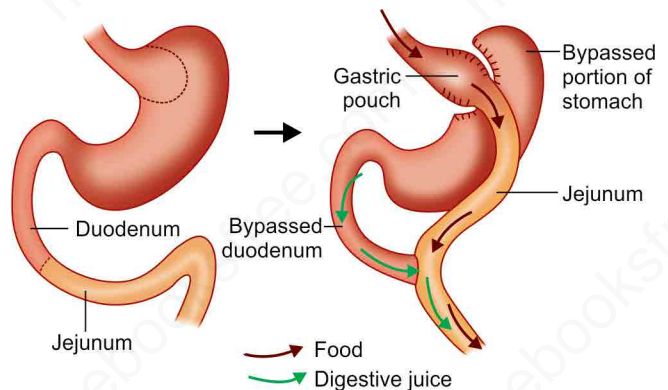
140. What is the diagnosis based on the given image?

- a. Gastroschisis
- b. Omphalocele
- c. Umbilical hernia
- d. Epigastric hernia



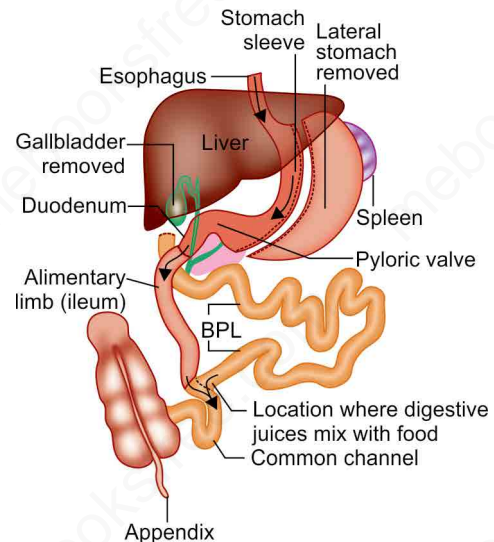
141. What is the name of this bariatric procedure?

- a. LAGB
- b. VBG
- c. RYGB
- d. Biliopancreatic diversion



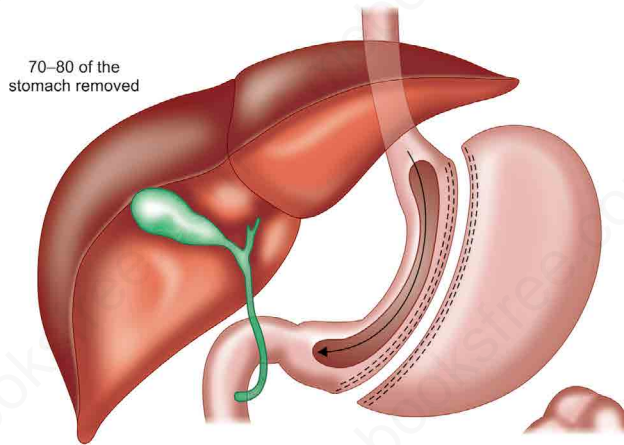
142. What is the name of this bariatric procedure?

- a. Biliopancreatic diversion: Largely malabsorptive, mildly restrictive
- b. Duodenal switch: Largely malabsorptive, mildly restrictive
- c. Biliopancreatic diversion: Mildly malabsorptive, largely restrictive
- d. Duodenal switch: Mildly malabsorptive, largely restrictive



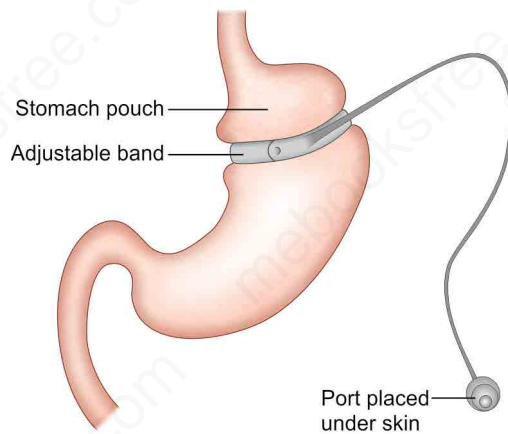
143. What is the name of this surgery?

- a. Billroth I
- b. Billroth II
- c. Subtotal gastrectomy
- d. Sleeve gastrectomy



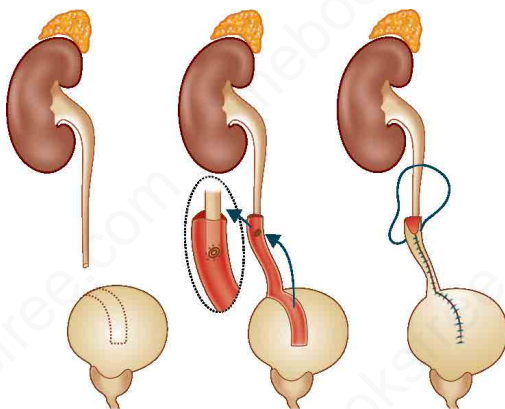
144. What is the name of this bariatric procedure?

- a. LAGB: Purely restrictive
- b. LAGB: Restrictive + Malabsorptive
- c. VBG: Purely restrictive
- d. VBG: Restrictive + Malabsorptive



145. What is the name of this operation?

- a. Lich-Gregoir operation
- b. Anderson Hynes operation
- c. Boari's operation
- d. Leadbetter-Politano operation



146. What is the grade of hemorrhoid based on the image given below?

- a. Grade I
- b. Grade II
- c. Grade III
- d. Grade IV



147. What is the name of this knot?

- a. Reef knot
- b. Figure of 8 bend
- c. Prusik knot
- d. Overhand knot



148. What is the name of this knot?

- a. Reef knot
- b. Figure of 8 bend
- c. Prusik knot
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- a. Reef knot
- b. Figure of 8 bend
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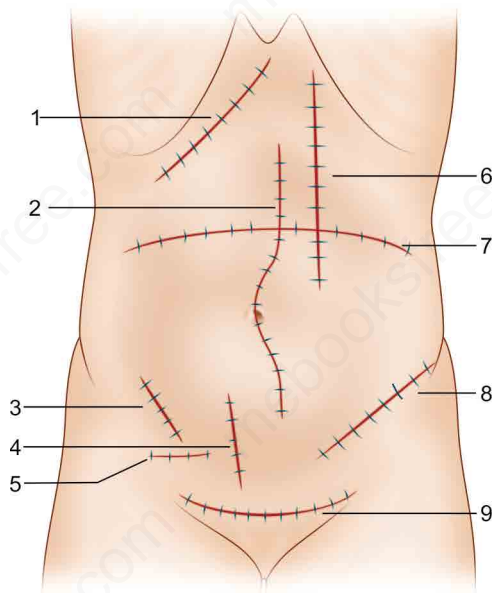
151. What is the name of this incision given for parotidectomy?

- Battle incision
- Modified Blairs incision
- Maylard incision
- Cherney incision



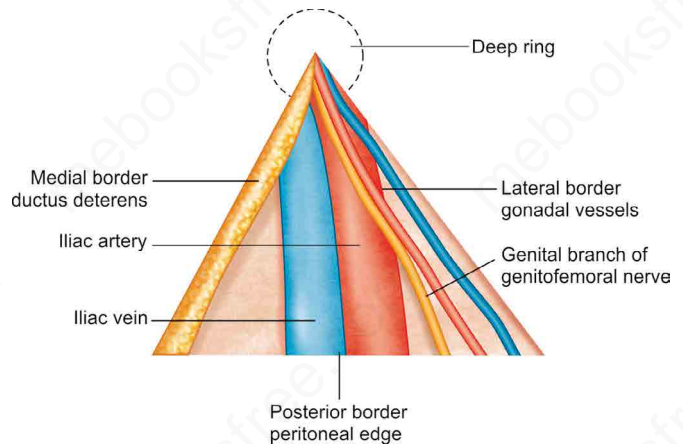
152. What are the names of incisions?

- 1-Kocher incision; 2-Midline incision; 3-McBurney incision; 4-Lanz incision; 5-Battle incision; 6-Paramedian incision; 7-Transverse incision; 8-Rutherford Morrison incision; 9-Pfannenstiel incision
- 1-Kocher incision; 2-Midline incision; 3-McBurney incision; 4-Battle incision; 5-Lanz incision; 6-Rutherford Morrison incision; 7-Transverse incision; 8-Paramedian incision; 9-Pfannenstiel incision
- 1-Kocher incision; 2-Midline incision; 3-McBurney incision; 4-Battle incision; 5-Lanz incision; 6-Paramedian incision; 7-Transverse incision; 8-Rutherford Morrison incision; 9-Pfannenstiel incision
- 1-Kocher incision; 2-Midline incision; 3-Rutherford Morrison incision; 4-Battle incision; 5-Lanz incision; 6-Paramedian incision; 7-Transverse incision; 8-McBurney incision; 9-Pfannenstiel incision



153. What is the name of this triangle?

- Triangle of Doom
- Triangle of pain
- Triangle of Death
- Corona Mortis



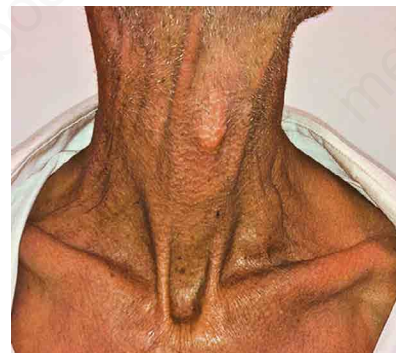
154. What is the type of fracture?

- Le Fort I
- Le Fort II
- Le Fort III
- Le Fort IV



155. Kallu, 60 years old male presented with carcinoma stomach and palpable LN in left supraclavicular region. What is the level of this lymph node?

- III
- IV
- V
- VI



156. A 45-year-old female presented to your OPD with this lesion in the left breast. What is the most probable diagnosis?

- DCIS
- LCIS
- Peau-d'orange
- Paget's disease of nipple



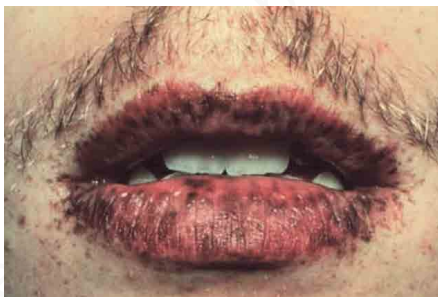
157. A 40-year-old female presented to your OPD with this lesion in the left breast. What is the most probable diagnosis?

- a. DCIS
- b. LCIS
- c. Peau-d'orange
- d. Paget's disease of nipple



158. A 25-year-old male presented to your OPD with recurrent abdominal pain. On the basis of the image of the patient, what is the most probable diagnosis?

- a. Cowden's disease
- b. HNPCC
- c. Peutz-Jegher's syndrome
- d. Cronkhite Canada syndrome



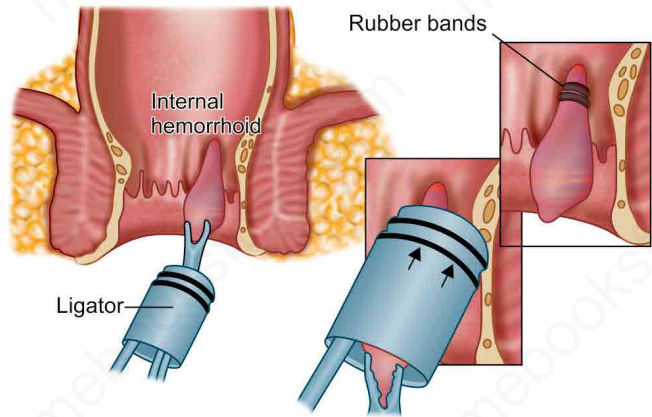
159. A 60-year-old male presented to your OPD with this problem. What is the preferred treatment?

- a. Frykman-Goldberg procedure
- b. Well's procedure
- c. Delorme procedure
- d. Ripstein procedure



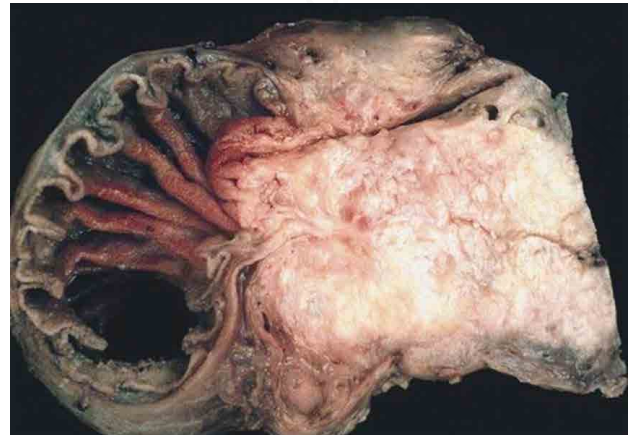
160. Intervention described below is the preferred treatment for which type of hemorrhoids?

- a. 1st and 2nd degree
- b. 2nd and selected patients of 3rd degree
- c. 3rd and 4th degree
- d. Selected patients of 3rd and 4th degree



161. What is the diagnosis based on the image given below?

- a. Acute pancreatitis
- b. Chronic pancreatitis
- c. Cystic neoplasm of pancreas
- d. Carcinoma head of pancreas



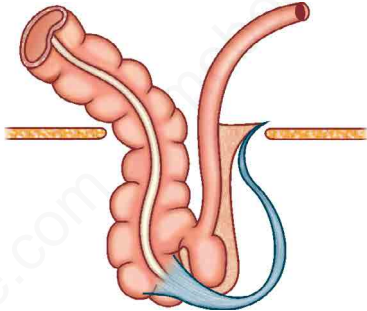
162. Which of the following is not associated with this finding given in the image?

- a. Carcinoma pancreas
- b. Carcinoma stomach
- c. Testicular tumors
- d. Ovarian cancer



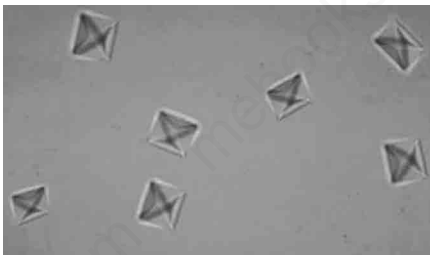
163. What is the name of this hernia?

- a. Ogilvie's hernia
- b. Hernia-en-Glissade
- c. Pantaloon's hernia
- d. Spigelian hernia



164. Identify this crystal found in urine analysis: ~

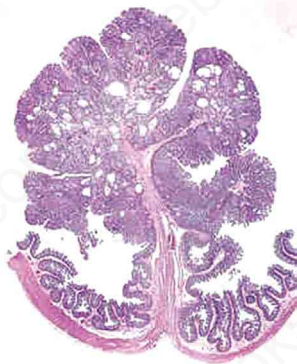
(AIIMS November 2015)



- a. Calcium carbonate stone
- b. Ammonium phosphate stone
- c. Uric acid
- d. Calcium oxalate stone

165. A 17-year-old patient develops intussusception for which he was operated and a segment of intestine showing multiple polyps was resected. Microscopy showed the following pathology. What is the likely diagnosis?

(AIIMS November 2015)



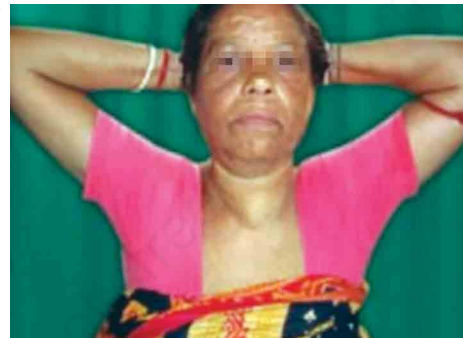
- a. Tubulovillous polyps
- b. Hamartomatous polyps
- c. Inflammatory polyps
- d. Adenocarcinoma

166. Which one of the following statements is true regarding the picture depicted here? (APPG 2016)



- a. Commonly seen on eyelids, genitalia, palms & soles
- b. Tend to occur 3 months to one year after initial insult
- c. All these statements are True
- d. Commonly extend into underlying subcutaneous tissue

167. This picture depicts _____ of examination of the thyroid gland. Choose the correct answer: (APPG 2016)



- a. Kocher's method
- b. Lahey's method
- c. Crile's method
- d. Pizzillo's method

168. Which one of the following statements is TRUE regarding the clinical sign being elicited here? (APPG 2016)

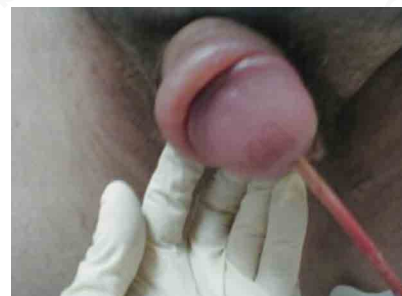


- a. This test is for eliciting shifting dullness
- b. This test helps to detect ascites
- c. The hand on the midline below the umbilicus will feel the vibrations in patients with ascites
- d. All these statements are True

169. Which of the following are TRUE regarding the picture depicted here of a patient who underwent Foley's catheterization?

- (P) Obstruction of venous & lymphatic return from glans
- (Q) Commonly due to sickle cell anemia
- (R) The condition occurred due to the doctor forgetting to replace the retracted prepuce
- (S) Previous circumcision is the cause of this condition here

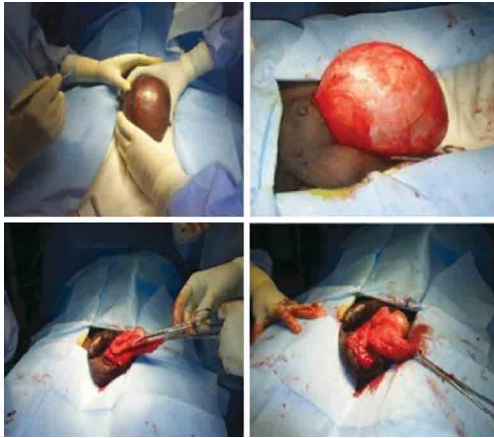
(APPG 2016)



- a. PQRS are all true
- b. Only R & S are true
- c. Only P & R are true
- d. Only P & S are true

170. What do these images depict?

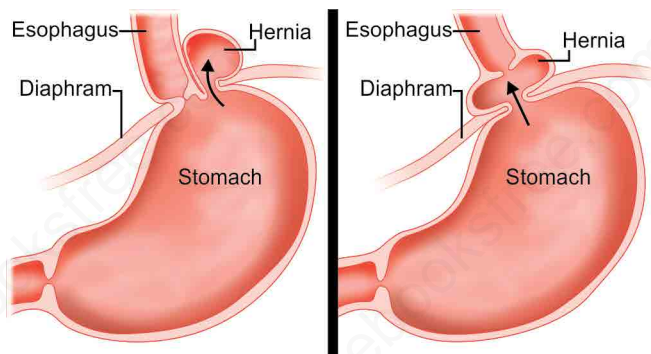
(APPG 2016)



- a. Jaboulay's operation
- b. Hernia repair
- c. Surgery for Fournier's gangrene
- d. Lord's plication for hydrocele

171. Select the TRUE statement regarding the picture depicted here:

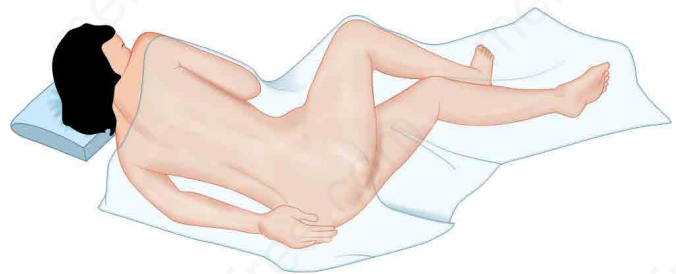
(APPG 2016)



- a. A is known as sliding hernia
- b. Part of upper stomach enters into thorax in both A & B
- c. A is the more common form
- d. A causes symptoms of Gastro-esophageal reflux

172. What is this position called?

(APPG 2016)



- a. Trendelenburg position
- b. Lloyd Davis position
- c. Fowler position
- d. Sim's position

173. What is this sign called?

(APPG 2016)



- a. Troisier sign
- b. Chvostek's sign
- c. Lhermitte's sign
- d. Trousseau's sign

EXPLANATIONS

1. Ans. b. Sponge holding forceps

Ramsey's Sponge Holding Forceps
<ul style="list-style-type: none"> Used for cleansing the skin with swab dipped in antiseptic solution during all operations Used for removing laminated membrane and the daughter cysts during operation of hydatid cyst Used to hold the fundus and Hartmann's pouch of gall bladder during cholecystectomy Used to swab an abscess cavity

2. Ans. b. Kocher's hemostatic forceps

Kocher's hemostatic forceps
<ul style="list-style-type: none"> Used during appendectomy to crush the base Used to hold perforating vessels during mastectomy Used during subtotal thyroidectomy Used to hold bleeding vessels while operating on palm and sole

3. Ans. a. Lister's sinus forceps

Lister's sinus forceps
<ul style="list-style-type: none"> Used for incision and drainage of abscess by Hilton's method May be used to hold a guaze swab to clean the abscess cavity

4. Ans. d. All of the above

Allis Tissue Forceps
<ul style="list-style-type: none"> Used during laparotomy to retract skin margins Used to hold neck of bladder during bladder neck resection Used to hold skin flaps while excising lipoma, sebaceous cyst or LN Used during thyroid operations, neck dissection to hold the margins of skin while raising skin flaps

5. Ans. c. Babcock's tissue forceps

Babcock's tissue forceps
<ul style="list-style-type: none"> Used during appendectomy Used during gastrectomy, gastrojejunostomy to hold the margins of stomach while applying the occlusion clamps Used during small and large intestine resection anastomosis to hold the margins of gut Used to hold the cut margins of bladder during suprapubic cystolithotomy

6. Ans. d. Lane's tissue forceps

Lane's tissue forceps
<ul style="list-style-type: none"> Used during submandibular or parotid gland excision to hold the gland during dissection from the adjacent structures During mastectomy, it may be used to hold the breast while dissecting it off from the pectoral fascia May be used to fix the draping sheets and suction tubes to the draping sheet

7. Ans. d. All of the above

Toothed dissecting forceps
<ul style="list-style-type: none"> Used to hold the cut skin margins during suturing Used to hold the linea alba or the rectus sheath during closure of abdominal incision Used to hold the scalp during closure of scalp incision

8. Ans. c. Czerney's retractor

Czerney's retractor
<ul style="list-style-type: none"> Used for tissue retraction appendectomy, thyroidectomy, mastectomy and inguinal hernia operation

9. Ans. a. Morris retractor

Morris retractor
<ul style="list-style-type: none"> Used for tissue retraction appendectomy, thyroidectomy, mastectomy and inguinal hernia operation

10. Ans. d. All of the above

Double hook retractor
<ul style="list-style-type: none"> Used to retract skin flap for excision of sebaceous cyst Used during venesection for retraction of skin Used during tracheostomy for retraction of skin and thyroid isthmus

11. Ans. c. Volkman's retractor

Cat's paw or Volkman's retractor
<ul style="list-style-type: none">Used for retraction of skin flaps or fascia for operation at the surface, e.g. excision of the sebaceous cyst, lipoma, dermoid.

12. Ans. d. Deaver's retractor

Deaver's retractor
<ul style="list-style-type: none">Used during cholecystectomy for retraction of right lobe of liverUsed during pancreaticojejunostomy for retraction of stomachUsed during kidney operations to retract the abdominal wall

13. Ans. c. Joll's thyroid retractor

Joll's thyroid retractor
<ul style="list-style-type: none">Self retaining retractor used during thyroid operations to retract skin flaps

14. Ans. a. Kocher's thyroid dissector

Kocher's thyroid dissector
<ul style="list-style-type: none">Used during thyroid surgeries, used to dissect the superior thyroid pedicle

15. Ans. d. Pile holding forceps

Pile holding forceps
<ul style="list-style-type: none">Used during pile operation to hold the pile mass

16. Ans. c. Desjardins forceps

Desjardins choledocholithotomy forceps
<ul style="list-style-type: none">Used during choledocholithotomy for stone removalUsed during laparoscopic cholecystectomy for stone removalMay also be used during removal of kidney, ureteric or bladder stone

17. Ans. b. Kehr's T-tube

Kehr's T-tube
<ul style="list-style-type: none">Following choledochotomy, the bile duct is closed over a T-tube, as primary closure of bile duct is associated with higher incidence of leakageUsed to drain bile duct following repair of bile duct injury. The T-tube acts as a stent and is usually kept for 4-6 weeks

18. Ans. b. Doyen's intestinal occlusion clamp

Doyen's straight intestinal occlusion clamp
<ul style="list-style-type: none">Used for gut resection and anastomosis

19. Ans. a. Payr's crushing clamp

Payr's gastric crushing clamp
<ul style="list-style-type: none">Used during partial gastrectomies

20. Ans. a. Pyelolithotomy forceps

Pyelolithotomy forceps
<ul style="list-style-type: none">Used to hold the stone during nephrolithotomy, pyelolithotomy or ureterolithotomy

21. Ans. c. Sprapubic cystolithotomy forceps

Sprapubic cystolithotomy forceps
<ul style="list-style-type: none">Used for suprapubic cystolithotomy

22. Ans. c. Doyen's mouth gag

Doyen's mouth gag
<ul style="list-style-type: none">Used to open mouth during intraoral operations like glossectomy, cleft palate operation, excision of intraoral ranula

23. Ans. c. Tracheal dilator

Tracheal dilator
<ul style="list-style-type: none">Used during tracheostomy

24. Ans. a. Aneurysm needle

Aneurysm needle
<ul style="list-style-type: none">Used during venesection to pass ligature around the vein

25. Ans. b. Veress needle

Veress needle
<ul style="list-style-type: none">Used for induction of pneumoperitoneum during laparoscopic surgeries

26. Ans. b. Mayo's towel clip

Mayo's Towel Clip
Curved blades helps to hold entire thickness of drapes firmly Used to fix drapes, suction tubes, laparoscopic cables and diathermy wires on OT table

27. Ans. a. Doyen's towel clip

Doyen's Towel Clip
<ul style="list-style-type: none">Short instrument with curved blades, used to fix the towels during draping

28. Ans. c. Moynihan's tetra towel clip.

Moynihan's Tetra Towel Clip
<ul style="list-style-type: none">Curved blades with four teeth (two teeth in each blade)Used to hold the cut edges of skin incision to the four corners of draped tetra towels to isolate the operative field

29. Ans. d. Doyen's coastal elevator

Doyen Rib Raspatory (Doyen's Coastal Elevator)
<ul style="list-style-type: none">Used to remove tissue and cartilage from the ribs

30. Ans. d. Balfours retractor

Balfour Abdominal Retractor
<ul style="list-style-type: none">Self-retaining retractor used in laparotomy procedures, cesarean sections and bowel resection.

31. Ans. b. Beckman Weitlaner retractor

Beckman Weitlaner retractor: Used to retract or hold back tissue or bone for surgical exposure
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32. Ans. d. Retracting bladder neck

Bladder Neck Retractor: Used to retract bladder neck in bladder surgeries
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33. Ans. d. Used with blade for skin incision

Bard Parker Handle (BP Handle): Blades are held in position by BP Handle to give incisions
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34. Ans. d. Used to pick sterilized instruments

Cheate's Forceps
<ul style="list-style-type: none">Used to pick sterile articles (instruments and drapes) to avoid touching the instruments while transferring them from the tray to table

35. Ans. c. Duval lung holding forceps

Duval Lung Holding Forceps
<ul style="list-style-type: none">Used to grasp lung tissue during lobectomy or pneumonectomyTriangular aperture and fine serrations in the distal balde provide firm grip without any trauma

36. Ans. b. Farabeuf retractor

Farabeuf Double-Ended Retractor
<ul style="list-style-type: none">Versatile handheld retractor used in dentistry, in wrist and hand procedures, or in hernia repair

37. Ans. c. Harvesting skin graft

Humby Knife
<ul style="list-style-type: none">A knife with a roller attached, used for cutting skin grafts of varying thicknessThe distance between the roller and blade of the knife can be varied by means of a calibration device.

38. Ans. b. Light bulldog clamp

Light Bulldog Clamp
<ul style="list-style-type: none">It has pinch cock action to open and close with fine tranverse serrations in the bladeUsed for temporary occlusion of small peripheral blood vesselsCan be used as a suture tag

39. Ans. c. Pott's bulldog clamp

Pott's Bulldog Clamp
<ul style="list-style-type: none">• Paper clip like instrument with serrations and spring loaded handle which permits a secure grip of the vessel• Used for temporary occlusion of small peripheral blood vessels

40. Ans. a. Satinsky vascular clamp

Satinsky Vascular Clamp
<ul style="list-style-type: none">• Used for partial occlusion of blood vessel• Partially occlude the wall of a vessel over a distance; occludes blood flow to continue through the rest of the vessel.

41. Ans. a. Mayo scissors

Mayo's Scissors
<ul style="list-style-type: none">• Used for cutting tough tissues; used for cutting ligaments

42. Ans. b. Metzenbaum scissors

Metzenbaum Scissor
<ul style="list-style-type: none">• Used for cutting delicate tissues like intestine, bladder (viscera)

43. Ans. b. Needle holder

Mayo Hegar Needle Holder
<ul style="list-style-type: none">• Smaller distal blades with cross serrations with a groove in middle• Ratio of length of handle to blade is 4:1• Needle is placed at junction of proximal 2/3rd and distal 1/3rd of the blade• Used for suturing skin and other organs

44. Ans. d. Ovum forceps

Ovum Forceps
<ul style="list-style-type: none">• Used to remove placental fragments, small endometrial polyps from the uterus.• Used to remove gall stone from gall bladder during extraction of gall bladder

45. Ans. c. Russian tissue forceps

Russian Tissue Forceps
<ul style="list-style-type: none">• Clubbed tip in the blades with serrated inner surface• Used to hold skin while suturing

46. Ans. b. Right angle forceps

Right Angle Forceps (Meigster or Lahey)
<ul style="list-style-type: none">• Used to dissect pedicle, pass ligatures, to hold bleeding vessel in depth, to dissect and pass ligatures to cystic duct and cystic artery in cholecystectomy

47. Ans. d. Rib shear

Rib Shear: Used to cut the ribs

48. Ans. c. Proctoscope

Kelly's Rectal Speculum (Proctoscope)
<ul style="list-style-type: none">• Length: 10 cm• Used to visualize the lower rectum and anus• Used to diagnose hemorrhoids, anal polyps, internal opening of the perianal fistula• Used to diagnose and treat hemorrhoids and other lesions in the anorectal area.

49. Ans. c. Periosteal elevator

Periosteal Elevator
<ul style="list-style-type: none">• Used to elevate and dissect bone, tissue, nerves, clean and scrape bone.• Used to expose fracture sites or bone in other procedures.• Used to strip portions of the membrane (periosteum) covering the exterior surface of a bone.

50. Ans. c. Scapula retractor

Scapula Retractor: Used to retract scapula during thoracotomy

51. Ans. c. Langenbeck's retractor

Langenbeck's Retractor
<ul style="list-style-type: none"> Retractor used in hernia surgery and superficial surgeries to retract skin, fascia and muscles

52. Ans. b. Urethral dilator

Urethral Dilator: Used to dilate urethra in urethral strictures and before cystoscopy

53. Ans. a. Bile duct dilator

Bake Bile Duct Dilator
<ul style="list-style-type: none"> Used in choledocholithotomy, after removing the stones from the bile duct Used to sound the bile duct for any retained stone Used to check the patency of ampulla of Vater

54. Ans. b. Mayo's vein stripper

Mayo's Vein Stripper: Used in the stripping of varicose veins
--

55. Ans. a. Gigli saw

Gigli's Saw: Used to cut bones in amputations

56. Ans. a. Mosquito hemostatic forceps













Mosquito Hemostatic Forceps
<ul style="list-style-type: none"> Used to hold fine bleeding vessels Used to puncture the mesoappendix at an avascular site


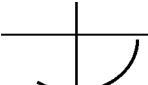



57. Ans. b. Spencer Wells hemostatic forceps

Spencer-Wells Hemostatic Forceps
<ul style="list-style-type: none"> Used to hold the bleeding vessel Used to split internal oblique and transversus abdominis during appendectomy Used to do blunt dissection

58. Ans. c. A = Backhaus towel clamp. B = Halstead mosquito forceps. C = Allis forceps. D = Babcock intestinal forceps

59. Ans. c. Cutting edge needle

Needle Point Symbol		
	Point Type	Symbol
	Taper Point	
	Blunt Taper Point	
	Cutting Edge	
	Reverse Cutting Edge	
	Tapercut	
	Micro-Point Spatula curved	

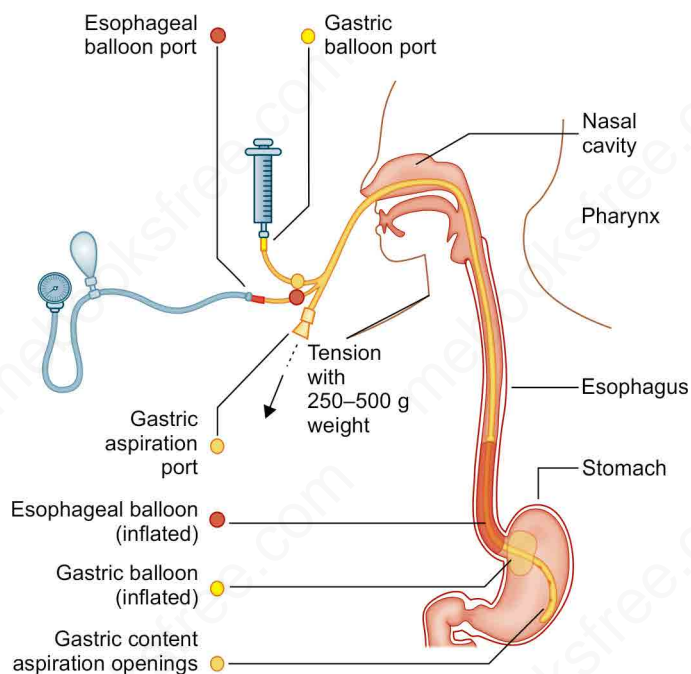
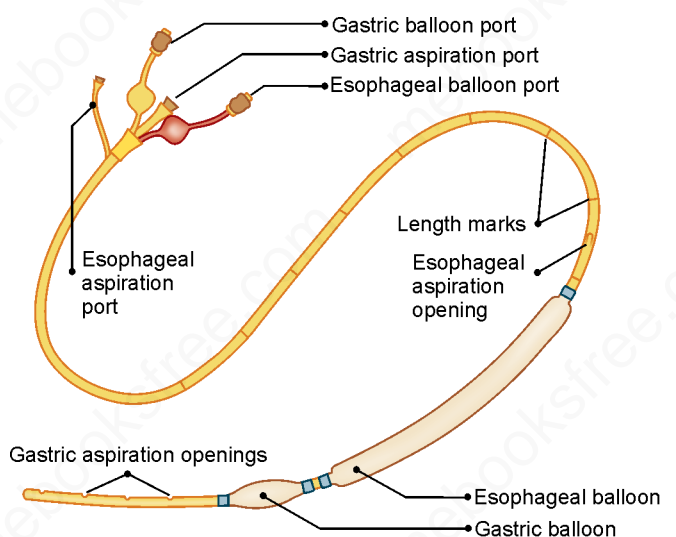
Needle Shape							
1/2 Circle	3/8 Circle	1/4 Circle	5/8 Circle	Straight			
							
Metric	1.5	2-2.5	3	3.5	4	5	6
USP	5/0	4/0	3/0	2/0	0	1	2

60. Ans. a. Nelaton catheter

Nelaton Catheter
<ul style="list-style-type: none"> Nelaton catheters can be used for one-time emptying of the bladder, for instance during/after surgery or to determine the amount of urine in the bladder.

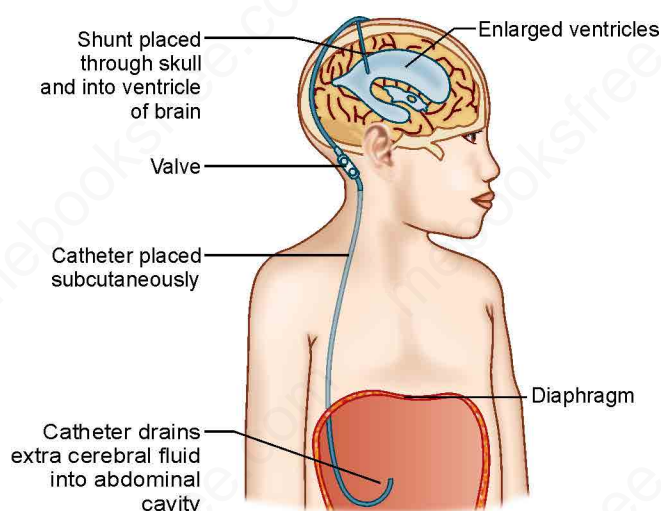
61. Ans. c. Sengstaken Blakemore tube

Sengstaken Blakemore Tube
<ul style="list-style-type: none"> The tube is passed down into the esophagus and the gastric balloon is inflated inside the stomach. Traction is applied to the tube so that the gastric balloon will compress the GE junction and reduce the blood flow to esophageal varices. Used only in emergencies where bleeding from presumed varices is impossible to control with medication alone. Endotracheal intubation before the procedure is strongly advised to secure the airway to prevent aspiration



62. Ans. d. Ventriculoperitoneal shunt Ref: Bailey 26th/p-608

Ventriculoperitoneal Shunt
<ul style="list-style-type: none"> • MC shunt for hydrocephalus: Ventriculoperitoneal shunt • It involves the insertion of a catheter^o into the lateral ventricle (usually right frontal or occipital) • The catheter is then connected to a shunt valve under the scalp and finally to a distal catheter, which is tunneled subcutaneously down to the abdomen and inserted into the peritoneal cavity. • If the CSF pressure exceeds the shunt valve pressure, then CSF will flow out of the distal catheter and be absorbed by the peritoneal lining. • Other options for distal catheter placement include the right atrium via the deep facial and jugular vein (ventriculoatrial shunt) or the pleural cavity (ventriculopleural shunt).



63. Ans. b. Fogarty catheter

Fogarty Embolectomy Catheter
<ul style="list-style-type: none"> • Used to remove fresh emboli from vessels • Consists of a hollow tube with an inflatable balloon attached to its tip. • Inserted into the blood vessel through a clot. The balloon is then inflated to extract it from the vessel.

64. Ans. d. Malecot's catheter

Malecot's Catheter
<ul style="list-style-type: none"> • Self retaining catheter with an umbrella or flower at the tip • Used for draining urine from the urinary bladder, when the urethra is damaged as in suprapubic catheterization; drainage of urine from the kidney by percutaneous nephrostomy • Used for drainage of fluid collections, e.g. an abdominal abscess • Used as intercostal drain

65. Ans. c. Ureterocele (Ref: Smith 17/e p560-561; Campbell 10/e p3240-3259; Bailey 26/e p1286, 25/e p1290)

- IVP: Typical **Adder head** or **Cobra head** or **Spring onion appearance^o** is diagnostic of ureterocele

Ureterocele
<ul style="list-style-type: none"> • Diagnosis • USG: Hydroureteronephrosis, cyst in bladder • IVP: Typical Adder head or Cobra head or Spring onion appearance^o is diagnostic of ureterocele • MCU: A smooth filling defect^o in the trigonal area • Cystoscopy: Enlarging and collapsing cysts^o as urine flows

66. Ans. b. Carcinoma colon (Ref: Sabiston 19/e p1350-1353; Bailey 25/e p1179-1184; Shackelford 7/e p2051-2058)

- **Barium enema**: "Apple core" or "napkin ring" lesion, caused by a **constricting carcinoma^o**

Carcinoma Colon
Diagnosis: <ul style="list-style-type: none"> • Barium enema: "Apple core" or "napkin ring" lesion, caused by a constricting carcinoma^o

Colonoscopy
<ul style="list-style-type: none"> • Gold standard for diagnosis of colon cancer^Q. • Permits biopsy of the tumor to verify the diagnosis^Q • Inspect entire colon to exclude metachronous polyps or cancers^Q • Incidence of a synchronous cancer is about 3%^Q.
<ul style="list-style-type: none"> • Tumors causing complete obstruction: Water-soluble contrast enema is useful in to establish the anatomic level of the obstruction^Q.

67. **Ans. b. Chronic pancreatitis** (Ref: Sabiston 19/e p1521; Schwartz 9/e p1183; Bailey 26/e p1128, 1135, 1138, 25/e p1141; Shackelford 7/e p1123, 1136-1137)

- Chain of lakes appearance^Q or String of pearl appearance^Q or Beaded appearance^Q is characteristic of chronic pancreatitis.

Radiological Appearance		
Acute Pancreatitis	Chronic Pancreatitis	CA Pancreas
<ul style="list-style-type: none"> • Renal halo sign^Q • Gasless abdomen^Q • Ground glass appearance^Q • Colon cut off sign^Q • Sentinel loop^Q 	<ul style="list-style-type: none"> • Chain of lakes appearance^Q • String of pearl appearance^Q • Beaded appearance^Q • Numerous irregular calcifications^Q are pathognomonic (on X-ray) 	<ul style="list-style-type: none"> • Double contour of medial border of duodenal C loop • Double duct sign^Q • Dilated/widening of duodenal C loop^Q • Mucosal irregularity^Q • Scrambled egg appearance • Inverted/reverse 3 sign of Frostberg^Q • Rose thorning of medial wall of 2nd part of duodenum^Q

68. **Ans. d. Type 5 choledochal cyst** (Ref: Sabiston 19/e p1504-1505; Schwartz 9/e p1119; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p717; Shackelford 7/e p1402-1403)

- Central dot sign is seen in **Caroli's disease (Type V Choledochal cyst)**.

Caroli's disease (Type V Choledochal cyst)
Diagnosis: <ul style="list-style-type: none"> • CT findings: Portal vein radicals can be seen after enhancement within dilated intrahepatic bile ducts (central dot sign)^Q.

69. **Ans. c. Diffuse esophageal spasm** (Ref: Sabiston 19/e p1028-1032; Schwartz 9/e p851-853; Bailey 26/e p1017, 25/e p1039; Shackelford 7/e p142-143)

- Corkscrew or rosary-bead esophagus, segmental spasm or pseudodiverticulosis appearance^Q is characteristic of diffuse esophageal spasm.

Diffuse Esophageal Spasm
Diagnosis: <ul style="list-style-type: none"> • Barium swallow: <ul style="list-style-type: none"> - Corkscrew or rosary-bead esophagus, segmental spasm or pseudodiverticulosis appearance^Q - Due to presence of tertiary contractions^Q - Indicative of advanced disease^Q • Manometry is gold standard test for diagnosis^Q. <ul style="list-style-type: none"> - Classic manometry findings: Simultaneous, multi peaked contractions of high amplitude (>120 mm Hg) or long duration (>2.5 sec). - These erratic contractions occur after more than 20% of wet swallows.

70. **Ans. c. Adenomyomatosis** (Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p751, 1122; Shackelford 7/e p1364)

- The presence of cholesterol crystals in these sinuses in adenomyomatosis can result in "**diamond ring sign**"^Q, "**V-shaped**"^Q, or "**comet-tail**" artifacts^Q on USG.

Gallbladder Adenomyomatosis
Diagnosis: <ul style="list-style-type: none"> • USG: The presence of cholesterol crystals in these sinuses can result in "diamond ring sign"^Q, "V-shaped"^Q, or "comet-tail" artifacts^Q on USG. • Adenomyomatosis appears as a sessile polyp with characteristic microcysts on USG and is often >10 mm^Q. • Cholecystography is more specific for diagnosis.

71. **Ans. c. Carcinoma pancreas** (Ref: Sabiston 19/e p1535-1544; Schwartz 9/e p1220-1225; Bailey 26/e p1137, 25/e p1149-1152; Blumgart 5/e p919-925; Shackelford 7/e p1190-1196)

- **Double duct sign** on ERCP is highly suggestive of **pancreatic head cancer^Q**.

72. Ans. c. Ischemic colitis (Ref: Sabiston 19/e p1335-1337; Schwartz 9/e p1057; Bailey 26/e p1174)

- Thumb printing^Q (due to mucosal edema and submucosal hemorrhage)^Q is characteristic feature of ischemic colitis.

Colonic Ischemia
Diagnosis: <ul style="list-style-type: none"> • Abdominal X-ray: Thumb printing^Q (due to mucosal edema and submucosal hemorrhage)^Q. • CT scan: Nonspecific colonic wall thickening and pericolic fat stranding^Q. • Angiography is usually not helpful^Q because major arterial occlusion is rare. <ul style="list-style-type: none"> • Sigmoidoscopy: Characteristic dark, hemorrhagic mucosa^Q • Risk of precipitating perforation is high, so sigmoidoscopy is relatively contraindicated^Q in ischemic colitis.

73. Ans. c. Cecal volvulus (Ref: Sabiston 19/e p1315-1316; Schwartz 9/e p1055; Bailey 26/e p1188)

- Cecal volvulus: Distended cecum assumes a gas-filled comma shape or kidney bean shape^Q, the concavity of which faces inferiorly and to the right.

Cecal volvulus
Diagnosis: <ul style="list-style-type: none"> • Abdominal X-ray: Dilated cecum, displaced to the left side of the abdomen. • Distended cecum assumes a gas-filled comma shape or kidney bean shape^Q, the concavity of which faces inferiorly and to the right. • Haustral markings in the distended loop indicate that the dilated bowel is colon. • Torsion results in small bowel obstruction^Q (radiographic pattern of SBO) <ul style="list-style-type: none"> • Contrast enema is used to confirm the diagnosis and to exclude a carcinoma of the distal bowel as a precipitating cause of the volvulus^Q

74. Ans. c. Leiomyoma (Ref: Sabiston 19/e p1047-1048; Schwartz 9/e p874; Bailey 26/e p1004)

- Barium swallow is IOC for leiomyoma (classical, smooth, contoured, punched-out defect)^Q

75. Ans. b. Distal cholangiocarcinoma (Ref: Sabiston 19/e p1508-1512; Schwartz 9/e p1162; Bailey 26/e p1114-1116)

Cholangiocarcinoma		
Clinical Features: <ul style="list-style-type: none"> • Painless jaundice (70-90%) is MC symptom^Q of cholangiocarcinoma, followed by pruritus (66%), abdominal pain, weight loss (30-50%), fever (20%). • Gall bladder is palpable in distal cholangiocarcinoma 		
Diagnosis: <ul style="list-style-type: none"> • MRI/MRCP is an ideal imaging^Q modality for cholangiocarcinoma. • Duplex ultrasonography and MRCP are the principal radiographic techniques used to image hilar cholangiocarcinoma. • MDCT is the first examination in the pre-operative management of hilar cholangiocarcinoma^Q 		
<table> <tr> <th>Radiological Features of Cholangiocarcinoma</th></tr> <tr> <td> <ul style="list-style-type: none"> • Concentric stricturing^Q, which sometimes appears shouldered, polypoid appearance is rare • Mucin producing cholangiocarcinoma can produce strand-like filling defects^Q caused by mucin • Length of stricture is at least 1 cm • Golf-tree appearance is seen in papillary cancer^Q involving extrahepatic bile duct. </td></tr> </table>	Radiological Features of Cholangiocarcinoma	<ul style="list-style-type: none"> • Concentric stricturing^Q, which sometimes appears shouldered, polypoid appearance is rare • Mucin producing cholangiocarcinoma can produce strand-like filling defects^Q caused by mucin • Length of stricture is at least 1 cm • Golf-tree appearance is seen in papillary cancer^Q involving extrahepatic bile duct.
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76. Ans. c. Porcelain gallbladder (Ref: Sabiston 19/e p1481, 1506; Schwartz 9/e p1143; Bailey 26/e p1116)

Porcelain Gallbladder
Pathology: <ul style="list-style-type: none"> • Calcium salt deposition within the wall of a chronically inflamed gallbladder^Q
Clinical Features: <ul style="list-style-type: none"> • Most porcelain GB (90%) are associated with gall stones^Q. • Mean age of patients is 54 years (38-70 years). • Patients are usually asymptomatic and the condition is usually found incidentally on plain abdominal radiographs, sonograms or CT images.
Diagnosis: <ul style="list-style-type: none"> • In porcelain GB, plain radiographic findings are usually straight forward^Q. • CT scan is diagnostic in cases of doubt

77. Ans. b. **Achalasia cardia** (Ref: Sabiston 19/e p1025-1028; Schwartz 9/e p857-860; Bailey 26/e p1014-1017)

Achalasia Cardia
Diagnosis: <ul style="list-style-type: none"> Barium swallow: <ul style="list-style-type: none"> Dilated esophagus with a distal narrowing^Q "Bird's beak", "Pencil-tip" or "Rat's tail" appearance^Q Sphincter spasm and delayed emptying through the LES A lack of peristaltic waves in the body and failure of LES relaxation^Q Lack of a gastric air bubble^Q on the upright portion is a result of the tight LES not allowing air to pass easily into the stomach. Massive esophageal dilation, tortuosity, and a sigmoidal esophagus (megaesophagus) in advanced stage^Q Manometry is gold standard test for diagnosis.

78. Ans. d. **Carcinoma head of pancreas** (Ref: radiopaedia.org/articles/frostburg-inverted-3-sign-1)

- Frostburg inverted 3 sign is a sign seen on a barium examination where there is effacement and distortion of the mucosal pattern on the medial wall of the second part of the duodenum due to focal mass and local edema. It is most commonly associated with carcinoma of the head of the pancreas.

79. Ans. b. **Colonic diverticula** (Ref: Sabiston 19/e p1309-1310; Schwartz 9/e p1038-1041; Bailey 26/e p1170-1173)

Colonic Diverticula
Diagnosis: <ul style="list-style-type: none"> Barium enema is investigation of choice for colonic diverticulosis^Q. Thickening of the circular muscle fibres develops a concertina or saw-tooth appearance on barium enema^Q.

80. Ans. d. **Sigmoid volvulus** (Ref: Sabiston 19/e p1314-1315; Schwartz 9/e p1055; Bailey 26/e p1190)

- Sigmoid volvulus: Markedly dilated sigmoid colon with the appearance of a bent inner tube or coffee bean appearance^Q.

Sigmoid volvulus
Radiological (X-ray) Characteristics: <ul style="list-style-type: none"> Markedly dilated sigmoid colon with the appearance of a bent inner tube or coffee bean appearance^Q. Inferior convergence of the dilated loop points towards left side of pelvis. <ul style="list-style-type: none"> Contrast enema demonstrates the point of obstruction with the pathognomic 'birds beak' or 'bird of prey' or 'ace of spades' sign^Q.

81. Ans. c. **Struvite stone** (Ref: Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)

Struvite stones (Infection stones)
<ul style="list-style-type: none"> Composed of calcium, ammonium, magnesium phosphate (Triple phosphate stones)^Q Tend to grow in alkaline urine^Q, especially with Proteus infection and fill whole of the PCS, forming staghorn calculi^Q Formed in high urinary concentration of ammonia Most of the stag horn calculi are silent^Q and cause progressive destruction of renal parenchyma^Q.

82. Ans. c. **Intussusception** (Ref: Sabiston 19/e p1851; Schwartz 9/e p1433; Bailey 26/e p1190, 25/e p1196; Shackelford 7/e p1060-1061)

Radiological Investigations in Intussusception		
Plain X-ray Film	Barium Enema	Ultrasound
<ul style="list-style-type: none"> Features of small intestinal obstruction^Q Abdominal soft tissue density in some cases which may show: <ul style="list-style-type: none"> Target sign^Q: Soft tissue mass with concentric area of lucency due to mesenteric fat. Meniscus sign^Q: Crescent of gas within colonic lumen that outlines the apex of intussusception. 	<ul style="list-style-type: none"> Claw sign^Q: Rounded apex of intussusception protrudes into the contrast column Coiled spring sign^Q: Edematous mucosal folds of returning limb of intussusception outlined by contrast material. 	<ul style="list-style-type: none"> Target sign or Bull's eye sign on transverse scan^Q Pseudokidney sign on longitudinal scan^Q

83. Ans. d. A = liver. b. = gallbladder. c. = aorta. d. = left kidney e. = pancreas

84. Ans. a. **Accordion sign**

85. Ans. a. **ADPKD**

86. Ans. c. **Apple core appearance**

- Barium swallow: First investigation done^Q in suspected case of Carcinoma esophagus (classic finding of an apple core lesion^Q).

87. b. only P, R, S are correct

88. Ans. c. Medullary sponge kidney (Ref: Smith 17/e p515; Campbell 10/e p3191-3192)

IVP (Excretory urogram): IOC to diagnose medullary sponge kidneyQ
<ul style="list-style-type: none">• “Bristles on brush”^Q appearance due to dilated ducts• “Bouquet of flowers”^Q appearance due to calcification in the ectatic ducts

89. Ans. c. Coiled spring sign

90. Ans. b. Colon cut off sign

91. Ans. d. Hypertrophic pyloric stenosis.

Single bubble sign	Congenital Hypertrophic Pyloric Stenosis ^Q
Double bubble sign	Duodenal atresia ^Q , Annular pancreas
Triple bubble sign	Jejunal atresia ^Q

92. Ans. a. Duodenal atresia

93. Ans. b. Jejunal atresia

94. Ans. c. Ectopic ureteric orifice

95. Ans. c. A needle should be inserted into the chest wall in the second right intercostal space as an emergenc

96. Ans. b. Meningioma (Ref: Chapman 4/e p431)

Radiological findings in Meningioma	
<ul style="list-style-type: none">• Nearly all meningiomas enhance intensely^Q following contrast administration.• Abnormal vascular markings^Q• Enlarged foramen spinosum^Q on the side of lesion• Dural tail• Calcification in the tumor^Q	<ul style="list-style-type: none">• Invasion of bone cause localized bony hyperostosis / mixed osteoblastic & osteolytic response less commonly. It may show ‘sun ray spicules’ & local bone expansion with pneumatization so called ‘blistering’• Signs of increased intracranial tension^Q

97. Ans. b. Glioblastoma

- Glioblastoma multiforme: Ring enhancement with central necrosis on MRIQ.

98. Ans. a. EDH

99. Ans. b. SDH

100. Ans. c. Retrocaval ureter (Ref: Smith 17/e p563; Campbell 10/e p1147-1149; Bailey 26/e p1286, 25/e p1290)

Retrocaval Ureter (Circumcaval ureter)
Diagnosis: <ul style="list-style-type: none">• MRI is IOC to delineate anatomy clearly & non-invasively^Q• IVP: “Reverse J”, “Fish Hook” or “Shepherd crook”^Q deformity.

101. Ans. b. Flame sign (Ref: Smith 17/e p289-291; Campbell 10/e p2153-2155; Bailey 26/e p1311, 25/e p1314-1315)

Extraperitoneal Bladder Rupture
Cystography: <ul style="list-style-type: none">• Flame sign or pear sign^Q (pattern of contrast extravasation) & tear-drop bladder is seen

102. Ans. a. Pear sign

103. Ans. c. Tear drop bladder

104. Ans. d. Both B and C (Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2/e p244-245; Campbell 10/e p1516-1524; Bailey 26/e p1307, 25/1311)

Carcinoma Renal Pelvis
<ul style="list-style-type: none">• Goblet sign & Stipple sign describe the appearance of ureteral dilation below the site of an intraluminal ureteral filling defect, best seen at retrograde pyelography (RGP)^Q.• The Stipple sign refers to the pointillistic end-on appearance^Q on IVP or RGP of contrast material tracking into the interstices of a papillary lesion.• Because maturity of TCC have a papillary configuration, presence of this sign should raise the suspicion of TCC, while the Stipple sign is best seen in large papillary bladder tumors^Q, it can occur anywhere in urothelial tumor, which expresses papillary architecture.

- **CT urography** is **IOC** for evaluation of **upper urinary tract**^Q
- Ureteral tumors are often characterized by **ureteral dilation below the site of the lesion**, creating the appearance of a “**goblet**” (better appreciated on **RGP**)^Q
- **Bergman sign**^Q: A ureteral catheter passed upto ureter may coil distal to the ureter.

105. Ans. b. Jejunal obstruction

106. Ans. c. Chemodectoma (Ref: Sabiston 19/e p814-815; Schwartz 9/e p721-723; Bailey 26/e p704, 25/e p732; Devita 9/e p772-773)

Carotid body tumor (Chemodectoma)

Diagnosis:

- Doppler study
- **Carotid angiogram: Lyre sign**^Q (splaying of the internal & external carotid arteries)
- **FNAC & biopsy** are **contraindicated**^Q because of their **highly vascular nature**

107. Ans. b. Malignant lesion

108. Ans. b. Moth eaten calyx (Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301-1303, 25/e p1306-1308)

IVP in Tuberculosis

- **Earliest sign** is “**moth-eaten**” **calyx**^Q (Obliteration of clear cut outline of renal papilla) due to erosion.
- **Obliteration** of one or more **calyces** (calectasis, hydronephrosis)
- SOL in pelvis (**TB abscess**) seen as **splaying of calyces**^Q
- **Ureteric strictures**^Q (single or multiple)
- **Shrunken bladder** with irregular wall (**Thimble bladder**)^Q
- Absence of function of kidney due to complete ureteral occlusion & renal destruction (**autonephrectomy**)^Q

109. Ans. b. Pseudocyst

110. Ans. b. Fibroadenoma

Pattern of Calcification in Breast Diseases

Carcinoma	Microcalcification , punctate, branching ^Q
Fibroadenoma	Popcorn ^Q (coarse, granular, crushed stone)
Fibrocystic disease	Powdery
Fat necrosis	Curvilinear

111. Ans. d. Rim sign

Chronic Hydronephrosis

- **Rim sign**: On IVP, rim sign is seen due to **chronic hydronephrosis** (**Atrophic changes in kidney** with the **dilatation of pelvicalyceal system**). The inner margin of hydronephrotic rim is concave towards the renal hilum.

112. Ans. a. Spider leg appearance (Ref: Smith 17/e p507-510; Campbell 10/e p3170-3176; Bailey 26/e p1283-1284, 25/e p1286-1287)

IVP in ADPKD

- Stretching of the calyces by the cysts (**spider leg** or **bell like deformity**)^Q
- **Bubble appearance**^Q (calyceal distortion)
- **Swiss cheese appearance**^Q

113. Ans. a. String sign of Kantor (Ref: Sabiston 19/e p1254-1255; Schwartz 9/e p1007; Bailey 26th/1158, 25/e p1174-1175)






Barium studies in GI Tuberculosis

- **Earliest feature** is **spasm** and **hypermotility** with **edema of valve**^Q
- **Thickening of valve lips** with **narrowing of the terminal ileum** (**Fleishner** or **umbrella sign**^Q) is **characteristic of TB**.
- In advance disease, the characteristic deformity includes **symmetric, annular, napkin ring stenosis**^Q and obstruction or shortening and pouch formation.
- The **cecum** become **shrunken & retracted** out of the iliac fossa due to contraction of mesocolon (**pulled up cecum**)^Q
- **Loss of ileocecal angle** with **dilated terminal ileum** imparting **goose neck deformity**^Q
- **Narrowing of terminal ileum** due to irritability, along with shortened rigid cecum called as “**Sterlein sign**”^Q
- **Persistent narrow stream** of **barium** in the bowel indicates stenosis known as **String sign**^Q

114. Ans. d. Thimble bladder

115. Ans. d. Grade V VUR

International classification of vesicoureteral reflux

Grade I Contrast appears in the nondilated ureter	Grade II Contrast appears in the renal pelvis and calyces without dilation	Grade III Mild to moderate dilation of the ureter, renal pelvis, and calyces, with minimal blunting of the fornices	Grade IV Moderate ureteral tortuosity and dilation of the renal pelvis and calyces	Grade V Gross dilation of the ureter, renal pelvis, and calyces; loss of papillary impressions; and ureteral tortuosity
				

116. Ans. c. Zenker's diverticulum

117. Ans. a. Hydatid cyst

118. Ans. a. Simple hepatic cyst (Ref: Sabiston 19/e p1464; Schwartz 9/e p1119; Blumgart 5/e p1052-1054; Shackelford 7/e p1453-1457)

Simple Hepatic Cyst
<ul style="list-style-type: none"> Contain serous fluid, do not communicate with the biliary tree, and do not have septations^Q Diagnosis: USG (Posterior acoustic enhancement)

119. Ans. a. Gall stone

- USG in Gall stone: Posterior acoustic shadow

120. Ans. a. Invertogram

121. Ans. c. Gallbladder cholesterolosis (Ref: Bailey 26/e p1108, 25/e p1122)

Strawberry Gallbladder (Cholesterolosis)
<ul style="list-style-type: none"> It is an acquired^Q histologic abnormality of the gallbladder epithelium that results in an excessive accumulation of lipid (cholesterols esters and triglyceride)^Q within epithelial macrophage of the GB wall. Cholesterol stones are found in half of the cases^Q.
<ul style="list-style-type: none"> Pathology: Gross Appearance: The mucosa has pale, yellow streaks running longitudinally giving rise to the term strawberry gallbladder^Q (although the mucosa is usually bile stained rather than red). Diffuse form ("strawberry gallbladder"): GB mucosa is brick red and speckled with bright yellow flecks of lipid^Q. Localized form: Solitary or multiple "cholesterol polyps" studding the gallbladder wall^Q.

122. Ans. a. Thyroglossal cyst (Ref: Schwartz 9/e p1344; Sabiston 19/e p813-814)

Thyroglossal cyst
<ul style="list-style-type: none"> It is cystic swelling developed in the remnant of the thyroglossal duct or tract It may be present in any part of the thyroglossal tract^Q (thyroglossal tract extends from foramen cecum to the isthmus of thyroid)
Clinical Features: <ul style="list-style-type: none"> It is a midline swelling^Q, except in the region of the thyroid cartilage, where the thyroglossal tract is pushed to one side, usually to the left. Though it is a congenital swelling^Q most common age of presentation is between 15-30 years^Q. Cyst can be moved sideways but not vertically. Peculiar characteristic which helps in distinguishing thyroglossal cyst from other neck swelling. <ul style="list-style-type: none"> Moves up with protrusion of tongue^Q as the thyroglossal tract is attached to the tongue. Moves with deglutition^Q so do all thyroid swellings, subhyoid bursitis.

123. Ans. b. Calcium oxalate, uric acid, struvite, cystine (Ref: Smith 17/e p260-270; Campbell 10/e p 1287-1293, 1371-1373; Bailey 26/e p1293)

Crystal	Appearance
Calcium oxalate monohydrate	Dumbbell or hourglass ^o
Calcium oxalate dehydrate	Enveloped or bipyramidal ^o
Calcium phosphate (apatite)	Amorphous ^o
Brushite	Needle shaped ^o
Struvite	Coffin lid ^o
Uric acid	Multifaceted, irregular plates or rosettes ^o
Cystine	Hexagonal or benzene ring ^o

124. Ans. d. Artery forceps and needle holder

125. Ans. a. Achalasia cardia (Ref: Sabiston 19/e p1025-1028; Schwartz 9/e p857-860; Bailey 26/e p1014-1017)

- Massive esophageal dilation, tortuosity, and a sigmoidal esophagus (megaesophagus) is seen in advanced stage^o of achalasia cardia.

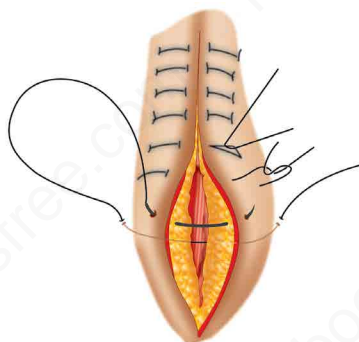
126. Ans. c. Meckels diverticulum (Ref: Sabiston 19/e p1268-1270; Schwartz 9/e p1002-1004, 1435; Bailey 26/e p1169-1170)

Meckel's diverticulum	
<ul style="list-style-type: none"> Most commonly encountered congenital anomaly of the small intestine^o Occur 2% of the population^o. 	
Rule of two in Meckel's diverticulum	
<ul style="list-style-type: none"> 2% prevalence^o 2 inch in length^o 2 feet proximal to ileocecal valve^o 	<ul style="list-style-type: none"> Half of these who are symptomatic are < 2 yrs^o of age
<ul style="list-style-type: none"> True^o diverticulum as it has all the 3 layers of the intestine^o. Located on the antimesenteric border of the ileum 45 to 60 cm proximal to the ileocecal valve Results from incomplete closure of omphalomesenteric or vitellointestinal duct. An equal incidence among men and women^o. 	
<ul style="list-style-type: none"> MC heterotopic tissue: Gastric mucosa (50%)^o > Pancreatic mucosa (5%) > colonic mucosa (rarely) 	

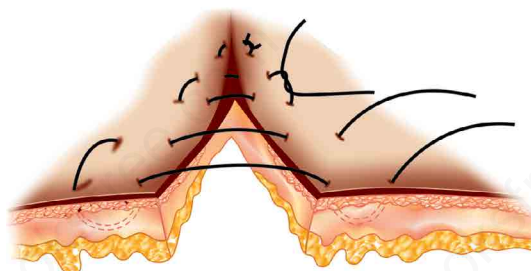
127. Ans. c. Struvite crystals

128. Ans. a. Purse string suture

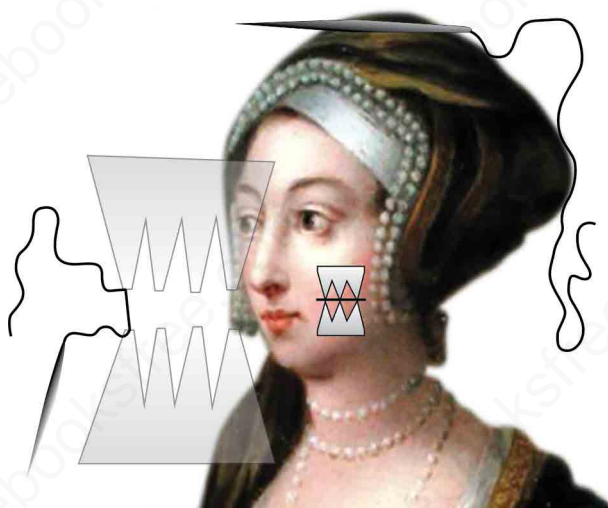
- Purse string suture: A surgical suture passed as a running stitch in and out along the edge of a circular wound in such a way that when the ends of the suture are drawn tight the wound is closed like a purse.



- Halsted's suture pattern: An interrupted suture pattern most useful in the suturing of friable tissues. The needle is passed in and out of the skin on one side of the incision, then across the incision and the suture is repeated on the other side. A pass is made at right angles to the suture and then a repeat of the stitch made back across the incision and the two ends tied.



- **Pare suture:** The approximation of the edges of a wound by pasting strips of cloth to the surface and stitching them instead of the skin.



- **Mattress interrupted sutures:** A suture made with a double stitch that forms a loop about the tissue on both sides of a wound and produces eversion of the edges.

129. Ans. a. Weigert-Meyers rule (Ref: Smith 17/e p559; Campbell 10/e p3385-3387, 3407-3408; Bailey 26/e p1285-1286, 25/e p1288-1290)

Duplication of Ureter (AD)	
Types:	
• Incomplete duplication: Both ureters join together and a single ureteric opening	
• Complete duplication: Both ureters open separately	
– Weigert-Meyer's rule^a: In cases of complete duplication, the upper pole ureter and the lower pole ureter rotate on their long axes so that the upper pole ureteric orifice is medial & caudal to the lower pole orifice^a .	
– The upper pole ureter becomes ectopic & obstructed^a , whereas the lower pole ureter end laterally and have a short intravesical tunnel leading to VUR^a .	

130. Ans. b. PUJ obstruction

131. Ans. d. Amputation

132. Ans. d. Cattell-Braasch maneuver (Ref: Sabiston 19/e p1796-1797)

Maneuvers for Retroperitoneal Exposure			
Kocher's Maneuver	Extended Kocher's Maneuver	Mattox Maneuver	Cattel-Braasch Maneuver
<ul style="list-style-type: none"> • Surgical maneuver to expose structures in the retroperitoneum^a behind the duodenum & pancreas^a • Used for mobilization of duodenum^a 	<ul style="list-style-type: none"> • Right sided medial visceral rotation^a • Right colon & duodenum is reflected medially^a • Exposes IVC, Infrarenal aorta, right renal artery & iliac vessels^a • Recommended for drainage of infra-mesocolic hematoma^a 	<ul style="list-style-type: none"> • Left sided medial visceral rotation^a • Left sided viscera (Left kidney, left colon, spleen & pancreas) are brought to midline^a • Exposes entire length of abdominal aorta, celiac axis, proximal part of mesenteric arteries and proximal left renal artery^a • Recommended for drainage of central supra-mesocolic hematoma^a 	<ul style="list-style-type: none"> • For extensive retroperitoneal exposure^a • Right colon is fully mobilized & reflected medially^a • Good option for exposure of the infrapancreatic segment^a

133. Ans. b. Kocher's maneuver

134. Ans. b. Brilliantly transilluminant

135. Ans. d. Ectopia vesicae

136. Ans. a. ESWL

137. Ans. b. PCNL

138. Ans. c. Femoral hernia

139. Ans. a. Gastroschisis

140. Ans. b. Omphalocele

141. Ans. c. RYGB

142. Ans. a. Biliopancreatic diversion: Largely malabsorptive, mildly restrictive

143. Ans. d. Sleeve gastrectomy

144. Ans. a. LAGB: Purely restrictive

145. Ans. c. Boari's operation (Ref: Bailey 26/e p1289, 25/e p1292, 1307)

Boari operation

- A **strip of bladder wall** is fashioned into a **tube to bridge the gap^a** between the cut ureter and the bladder.
- Used for **lower ureteric reconstruction**
- **Boari flap** provides the **needed length** to create a **tension-free anastomosis** between the **ureter and the bladder^a**

146. Ans. d. Grade IV (Ref: Sabiston 19/e p1387-1391; Schwartz 9/e p1057-1059; Bailey 26/e p1250-1257)

Classification of Internal hemorrhoids	
1st degree	Painless bleeding ^a , no prolapse
2nd degree	Prolapse through the anus, on straining but reduce spontaneously^a
3rd degree	Prolapse through the anal canal and require manual reduction^a
4th degree	Permanently prolapsed and cannot be manually reduced.^a

147. Ans. a. Reef knot

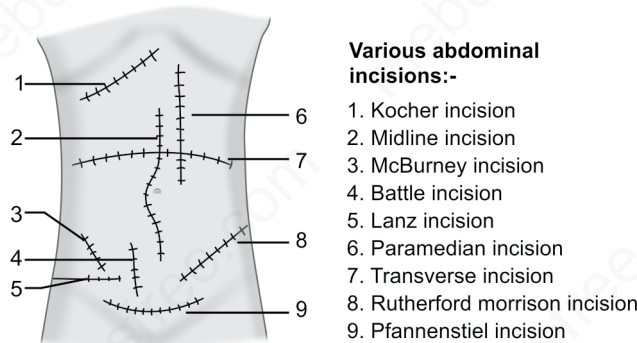
148. Ans. b. Figure of 8 bend

149. Ans. c. Prusik knot

150. Ans. d. Overhand knot

151. Ans. b. Modified Blairs incision

152. Ans. c. 1-Kocher incision; 2-Midline incision; 3-McBurney incision; 4-Battle incision; 5-Lanz incision; 6-Paramedian incision; 7-Transverse incision; 8-Rutherford Morrison incision; 9-Pfannenstiel incision



153. Ans. a. Triangle of Doom

154. Ans. b. Le Fort II (Ref: Sabiston 19/e p1927; Schwartz 9/e p487-488; Bailey 26/e p344-345, 25/e p329-330)

Midface Fractures	
• Midface fractures involving the maxilla can be classified by fracture patterns know as Le Fort I, II, and III.	
Le Fort I	<ul style="list-style-type: none"> • Fracture line runs above & parallel to palate^a • Effectively separates alveolus & palate from the facial skeleton above^a
Le Fort II	<ul style="list-style-type: none"> • Pyramidal in shape^a • Passes through the root of nose, lacrimal bone, floor of orbit, upper part of maxillary sinus & pterygoid plate^a • Orbital floor is always involved^a
Le Fort III	<ul style="list-style-type: none"> • Complete disjunction of the facial skeleton from the skull base^a • Fracture line runs high through the nasal bridge, septum & ethmoids, and through the bones of orbit to the frontozygomatic suture^a.

155. Ans. b. IV

156. Ans. c. Peau-d'orange

157. Ans. d. Paget's disease of nipple

158. Ans. c. Peutz-Jegher's syndrome

159. Ans. c. Delorme procedure

160. Ans. b. 2nd and selected patients of 3rd degree

161. Ans. d. Carcinoma head of pancreas

162. Ans. c. Testicular tumors (Ref: Sabiston 19/e p1207; Schwartz 9/e p932; Bailey 26th/1050, 25/e p1070)


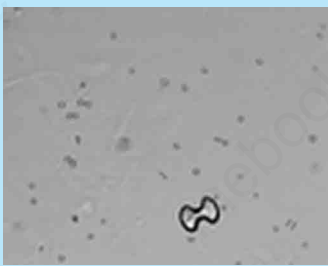
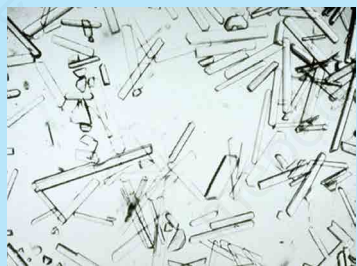
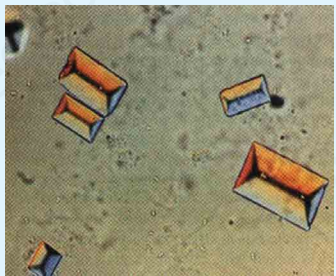
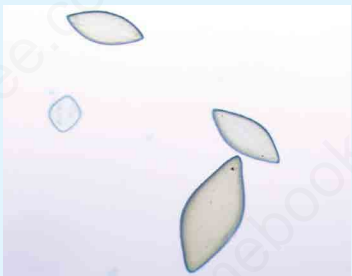
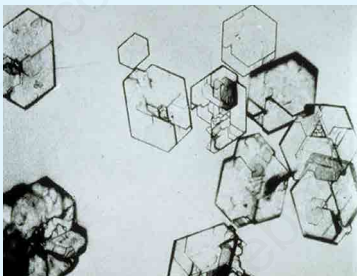
Sister Mary Joseph nodule	
Gastrointestinal malignancies	Gynecological malignancies
<ul style="list-style-type: none"> • Gastric cancer (MC)^a • Colonic cancer^a • Pancreatic cancer (mostly body & tail)^a 	<ul style="list-style-type: none"> • Ovarian cancer^a • Uterine cancer^a

163. Ans. b. Hernia-en-Glissade (Ref: Sabiston 19/e p1126; Bailey 25/e p977; Schackelford 7/e p566)

Sliding Hernia (Hernia en Glissade)	
<ul style="list-style-type: none"> Hernias in which posterior wall of the sac is formed by a viscus^a Viscera is liable to be injured if the hernia sac is resected during surgery^a More common on left side^a 	
Most Common Content	
<ul style="list-style-type: none"> Left side: Sigmoid colon^a & its mesentery (MC) Right side: Cecum^a 	

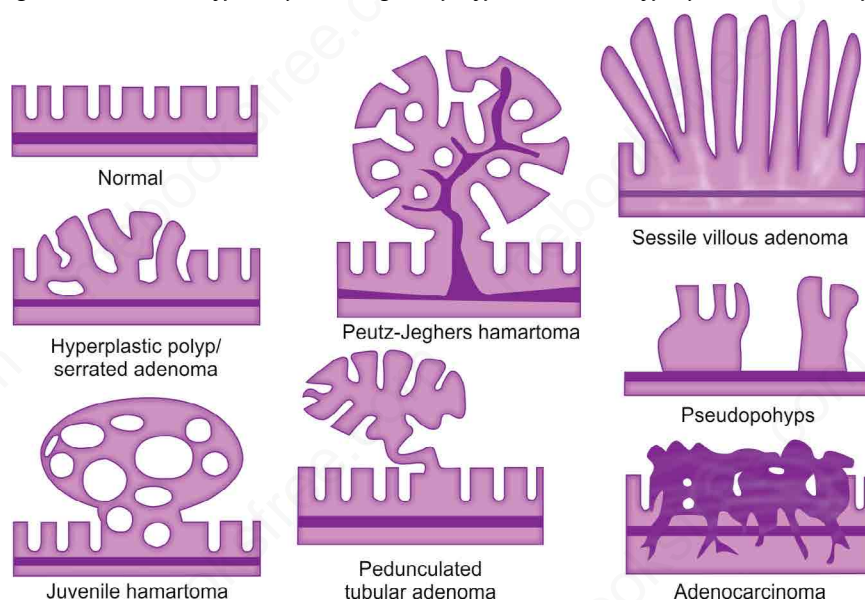
164. Ans. d. Calcium oxalate stone (Ref: Smith 17th/249-254; Campbell 10th/1296-1302; Bailey 25th/1295-1300)

In the given image, which shows enveloped or bipyramidal crystals are seen in calcium oxalate (dihydrate) stones.

Calcium oxalate	Calcium oxalate monohydrate	Brushite
Enveloped or bipyramidalQ	Dumbbell or hourglassQ	Needle shapedQ
		
Struvite	Uric acid	Cystine
Coffin lidQ	Multifaceted, irregular plates or rosettesQ	Hexagonal or benzene ringQ
		

165. Ans. b. Hamartomatous polyps (Ref: Sabiston 19/e p1342; Schwartz 9/e p1042-1043; Bailey 26/e p1161-1164, 25/e p1177-1178; Shackelford 7/e p2030-2032)

The given histology shows a large and pedunculated polyp with a firm lobulated contour. An arborizing network of connective tissue is seen with well-developed smooth muscle extending into the polyp and surrounding normal abundant glands lined by normal intestinal epithelium rich in goblet cells. This is typical of Peutz-Jegher's polyps, which are a type of hamartomatous polyp.



166. Ans. b. Tend to occur 3 months to one year after initial insult (Ref: Sabiston 19/e p164-165; Schwartz 9/e p225-227; Bailey 26/e p30, 25/e p30-31; Robbins 8/e p106-107)

Feature	Hypertrophic scar	Keloid
Genetic	Not familial ^Q	May be familial ^Q
Race	Not race related ^Q	Black^Q >white
Sex	Female =male	Female^Q >male
Age	Children ^Q	10-30 years ^Q
Border	Remains within wound^Q	Outgrows wound area
Natural History	Subsides with time	Rarely subsides
Site	Flexor surfaces ^Q	Sternum (MC^Q) , shoulder, face
Etiology	Related to tension^Q	Unknown
Develop	Within 4 weeks	3 months to year after trauma

167. Ans. d. Pizzillo's method

168. Ans. b. This test helps to detect ascites

169. Ans. c. Only P & R are true

170. Ans. a. Jaboulay's operation (Ref: Campbell 10/e p1009-1011; Bailey 26/e p1382, 25/e p1382)

Treatment of Vaginal hydrocele
• Small hydrocele: Lord's procedure (Plication of sac) ^Q
• Medium hydrocele: Jaboulay's procedure (Eversion of sac) ^Q
• Large hydrocele: Excision of sac ^Q

171. Ans. b. Part of upper stomach enters into thorax in both A & B (Ref: Sabiston 19/e p1081-1083; Schwartz 9/e p842-845; Bailey 26/e p1002-1003, 25/e p1024-1025; Shackelford 7/e p494-505)

Pathophysiology of Hiatus Hernia
Type I Hernia or sliding HH: <ul style="list-style-type: none"> Characterized by upward displacement of the GE junction into the posterior mediastinum^Q. The stomach remains in its usual longitudinal alignment^Q.
Type II Hernia: <ul style="list-style-type: none"> True PEH: Defined by a normally positioned intraabdominal GE junction with upward herniation of the stomach^Q alongside it
Type III Hernia: <ul style="list-style-type: none"> Mixed hernia: Characterized by displacement of both the GE junction and a large portion of the stomach cephalad into the posterior mediastinum^Q.
Type IV Hernia: <ul style="list-style-type: none"> Esophageal hiatus has dilated to such an extent that the hernia sac also contains other organs such as the spleen, colon, or small bowel^Q.

172. Ans. d. Sim's position

173. Ans. d. Trousseau's sign

Trousseau's syndrome	• Migratory thrombophlebitis ^Q
Trousseau's sign	• Carpopedal spasm in hypocalcemia^Q
Troisier's sign	• Palpable left supraclavicular LN (Virchow's node) ^Q

Annexures

- Name of Operation/Incisions.

Annexure 1

NAMED CLASSIFICATION FOR TUMORS

Important Tumor Classification	
Chang staging ^a	Medulloblastoma ^a
Masaoaka staging ^a	Thymoma ^a
Shimda index ^a	Neuroblastoma ^a
Reiss and Ellsworth classification Esson prognostic index ^a	Retinoblastoma ^a
Bloom-Richardson grading ^a	CA breast ^a
Noguchi classification ^a	Adenocarcinoma lung ^a
Sullivan modification of Macfarlane system ^a	Adrenocortical carcinoma ^a
Gleason	CA prostate ^a
Nevine staging	CA GB ^a
Duke staging	Colorectal carcinoma ^a
Robson staging	RCC ^a
Jackson	CA penis ^a

Annexure 2

GENES AND CHROMOSOMES

Syndrome	Genes	Locations
Breast/ovarian syndrome	BRCA1	17
	BRCA2 ^a	13 ^a
Cowden's disease	PTEN ^a	10 ^a
FAP	APC ^a	5 ^a
HNPCC	hMLH1 ^a	3 ^a
	hMSH2 ^a	2 ^a
	hMSH6	2 ^a
	hPMS1	2 ^a
	hPMS2	7 ^a

ii Surgery Essence

Hereditary papillary RCC	MET ^a	7 ^a
Li-Fraumeni	p53 ^a	17 ^a
	hCHK2	22
MEN-1	MEN1 ^a	11 ^a
MEN-2	RET ^a	10 ^a
NF-1	NF1 ^a	17 ^a
NF-2	NF2 ^a	22 ^a
Peutz-Jeghers syndrome	STK11 ^a	19 ^a
Retinoblastoma	RB ^a	13 ^a
Tuberous sclerosis	TSC1 ^a	9 ^a
	TSC2 ^a	16 ^a
VHL syndrome	VHL ^a	3 ^a
Wilms' tumor	WT ^a	11 ^a

Name of Incisions	
Lazy 'S', Sistrunk, Modified Blair's	Parotidectomy
McBurney's, Grid-Iron, McArthur, Lanz	Appendectomy
Pfannenstiel incision	Caesarean section Abdominal hysterectomy
Chevron Incision	Whipples procedure Upper abdominal Malignancies
Cherney Incision	Pelvic surgery (excellent surgical exposure to the space of Retzius and pelvic side walls)
Kocher's Incision	Open cholecystectomy
Kustner's Incision	Transverse incision made 5 cm above the symphysis pubis but below the anterior superior iliac spine
Maylard incision	<ul style="list-style-type: none"> A variation of Pfannenstiel incision Rectus abdominis muscles are sectioned transversely to permit wider access to the pelvis.
McEvedy's Incision	Lateral paramedian incision
Turner-Warwick's incision	<ul style="list-style-type: none"> Placed 2 cm above the symphysis pubis and within the lateral borders of the rectus muscle. Good for exposure of retropubic space.

Annexure 3

NAMED TRIADS

Important Triads		
Triad	Seen in	Components
Virchow's Triad ^Q	Thrombosis	Hypercoagulability + Stasis + Endothelial injury ^Q
Galezia's Triad ^Q		Dupuytren's contracture + Retroperitoneal fibrosis + Peyronie's disease of penis ^Q
Cushing's Triad ^Q	Intracranial hypertension	BP + Bradycardia + respiratory rate
Hutchison's Triad ^Q	Congenital syphilis	Hutchison's teeth (notched upper incisors) + Interstitial keratitis + Nerve deafness ^Q
Trotter's Triad ^Q	Nasopharyngeal Carcinoma	Conductive hearing loss + Immobility of homolateral soft palate + Trigeminal neuralgia ^Q

Important Triads		
Triad	Seen in	Components
Saints Triad		Hiatus hernia + Gallstones+ Colonic diverticulosis ^Q
Dieulafoy's Triad ^Q	Acute appendicitis	Hypersensitiveness of skin + Reflex muscular contraction + tenderness at Mac Burney's point ^Q
Quinke's Triad ^Q	Hemobilia	GI hemorrhage + biliary colic + jaundice ^Q
Borchardt's Triad ^Q	Gastric Volvulus	Epigastric pain + Inability to vomit + Inability to pass a NG tube ^Q
Tillaux's Triad ^Q	Mesenteric cyst	Soft fluctuant swelling in umbilical region + Freely mobile perpendicular to mesentery + Zone of resonance all around ^Q
Mackler's Triad ^Q	Boerhaave's syndrome	Thoracic pain + vomiting + cervical subcutaneous emphysema ^Q
Rigler's Triad ^Q	Gall stone ileus	Small bowel obstruction + Pneumobilia + Ectopic gallstone ^Q
Whipple's Triad ^Q	Insulinoma	Symptoms of hypoglycemia + S. glucose <45 mg/dl + Symptomatic relief on glucose ingestion ^Q

Annexure 4

LYMPH NODES

Most Common Lymph Nodes Involved	
CA Penis	Inguinal LN ^Q
CA Testis	On right: Inter-aortocaval ^Q LN On left: Paraaortic ^Q LN
CA Bladder	Obturator ^Q LN
CA Prostate	Obturator ^Q LN

Important Lymph Nodes	
Rotter's nodes ^Q	• Interpectoral nodes (CA breast) ^Q
Rouvier nodes ^Q	• Retropharyngeal nodes (CA Nasopharynx) ^Q
Delphian nodes ^Q	• Pre-cricoid/Pre-tracheal/Pre-laryngeal lymph nodes ^Q
Irish nodes ^Q	• Nodes in left axilla (CA stomach) ^Q
Sister Mary Joseph nodes ^Q	• Periumbilical metastatic cutaneous nodules
Virchow nodes ^Q	• Left supraclavicular node ^Q
Cloquet node ^Q	• Femoral canal node ^Q
LN of Lund ^Q	• Cystic lymph node ^Q
Krouse Lymph node	• Jugular fossa lymph node ^Q

Annexure 5

METASTASIS

Carcinoma Thyroid	
Type	Mode of spread
Papillary carcinoma	Lymphatic^a spread
Follicular carcinoma	Hematogenous^a spread
Medullary carcinoma	Both lymphatic and hematogenous^a spread
Anaplastic carcinoma	Direct invasion^a

Carcinoma Thyroid	
Type	MC site of Metastasis
Papillary carcinoma	Lungs^a
Follicular carcinoma	Bones^a
Medullary carcinoma	Liver^a
Anaplastic carcinoma	Lungs^a

Pulsating Secondaries
1. Follicular carcinoma thyroid ^a
2. RCC ^a

Bone Metastasis in Carcinoma Thyroid	
Follicular carcinoma	Osteolytic metastasis (Pulsating secondaries in flat bones) ^a
Medullary carcinoma	Osteoblastic metastasis ^a

Metastatic Tumors
Metastatic Tumors of Thyroid <ul style="list-style-type: none"> Rare, most cases are found in autopsy MC site of primary: CA Breast^a > CA Lung If thyroid metastases is detected pre-mortem, MC site of primary: RCC^a > CA Breast > CA Lung
Metastatic Tumors to lung, MC primary: CA breast^a
Metastatic Tumors to Pancreas <ul style="list-style-type: none"> MC site of primary: RCC^a > Malignant melanoma On autopsy, MC site of primary: CA lung^a
Metastatic Tumors Adrenal, MC site of primary: CA Lung^a
Metastatic Tumors to Small Bowel <ul style="list-style-type: none"> Metastatic tumors involving small bowel are more common than primary tumors MC site of primary: Other intra-abdominal organs MD extra-abdominal source: Melanoma > CA Breast > CA Lung
Metastatic Tumors to Skin <ul style="list-style-type: none"> MC site of primary in males: CA Lung^a MC site of primary in females: CA Breast^a Scalp is MC site for cutaneous metastatic disease^a
Metastatic Tumors to Liver <ul style="list-style-type: none"> MC site of primary: Colorectal cancer > CA lung > CA Pancreas > CA Breast > CA Stomach

Metastatic Tumors to CNS
<ul style="list-style-type: none"> MC site of primary for brain metastases: CA Lung^a > CA Breast MC site of primary for leptomeningeal metastases: CA Breast^a
Metastatic Tumors to esophagus, MC primary: CA lung^a
Metastatic Tumors to spleen
<ul style="list-style-type: none"> MC site of primary: Malignant Melanoma MC site of primary for Isolated Secondaries to spleen: CA ovary
Metastatic Tumors to Heart
<ul style="list-style-type: none"> MC primary in males: CA lung^a MC primary in females: CA breast^a
Metastatic Tumors to Testis
<ul style="list-style-type: none"> MC site of primary: CA prostate^a > CA lung > GI malignancies > melanoma > kidney
Metastatic Tumors to penis, MC site of primary: CA bladder^a

Annexure 6

MOST COMMON SYMPTOMS AND CHEMOTHERAPY

GI Malignancy	Chemotherapy
• CA Esophagus	ECF (Epirubicin + Cisplatin + 5-FU) ^a
• CA Stomach	ECF (Epirubicin + Cisplatin + 5-FU) ^a
• CA Pancreas	Gemcitabine ^a
• NET of pancreas	Streptozocin + 5-FU ^a
• Cholangiocarcinoma	Gemcitabine + Cisplatin ^a
• CA GB	Gemcitabine + Cisplatin ^a
• Small intestine adenocarcinoma	5-FU ^a
• Colorectal carcinoma	FOLFOX-IV (5-FU + Leucovorin + Oxaliplatin) ^a
• CA anal canal	Nigro Regimen: Chemoradiation (5-FU + Mitomycin C + Radiation) ^a

Most Common Symptom	
CA Esophagus	• Dysphagia > weight loss ^a
CA stomach	• Abdominal pain > weight loss ^a
Periampullary carcinoma (including CA head of pancreas)	• Jaundice^a
HCC	• Abdominal pain > weight loss ^a
Cholangiocarcinoma	• Painless progressive jaundice^a
CA Gallbladder	• Biliary colic^a
CA small bowel	• Abdominal pain^a
CA colon	• Abdominal pain^a
CA rectum	• Bleeding PR^a
CA anal canal	• Bleeding PR^a

Annexure 7

MOST COMMON SITES

Important Most Common Sites	
• Gastric ulcer ^Q	Lesser curvature (near incisura angularis)
• Peptic ulcer ^Q • Gastric outlet obstruction ^Q	1 st part of duodenum
• Small bowel ^Q adenocarcinoma • Atresia ^Q	Duodenum
• Polyps in PJS ^Q • Pneumatosis intestinalis ^Q	Jejunum
• Crohn's disease ^Q • Fistula, perforation and carcinoma in Crohn's disease ^Q • Typhoid ulcer ^Q • Tubercular ulcer ^Q • Small intestinal lymphoma ^Q • Gallstone ileus ^Q	Terminal Ileum
• Amebic colitis ^Q • Bleeding in angiodysplasia ^Q • Bleeding in colonic diverticula ^Q	Cecum and ascending colon
• Ischemic colitis ^Q	Splenic flexure
• Colonic diverticula ^Q • Stricture after ischemic colitis ^Q • Volvulus ^Q	Sigmoid
• Ulcerative colitis ^Q • Colorectal cancer ^Q • Hirschsprung's disease ^Q	Rectum

Annexure 8

TREATMENT OF CHOICE

Condition	Treatment of Choice
Duodenal Atresia	Duodenoduodenostomy ^Q
Annular pancreas	Duodenoduodenostomy ^Q
Superior mesenteric artery syndrome	Duodenojejunostomy ^Q

Enucleation is treatment of choice in
1. Hemangioma liver ^Q 2. Leiomyoma esophagus ^Q 3. Chylolymphatic cyst ^Q 4. Insulinoma involving head of pancreas ^Q

Annexure 9

CHARACTERISTIC RADIOLOGICAL APPEARANCES

Radiological Features	Seen in
• Apple core lesion on barium enema	Carcinoma colon ^a
• Claw appearance on barium enema	Intussusception ^a
• Saw tooth appearance	Colonic diverticula
• Bird beak appearance	Achalasia ^a Volvulus
• Cork screw appearance • Rosary bead appearance • Pseudodiverticula appearance	Diffuse esophageal spasm ^a
• String sign of Kantor	Crohn's disease ^a Tuberculosis
• Thumb print sign	Ischemic colitis ^a
• Squeeze sign, Cushion sign, Tenting sign, naked fat sign	Colonic lipoma ^a
• Rat tail appearance	Achalasia ^a

Characteristic Appearances	
ADPKD	<ul style="list-style-type: none"> • Spider leg or Bell deformity^a • Bubble or Swiss cheese appearance on IVP^a
Infantile PKD	• Sunburst pattern on IVP ^a
Medullary Sponge Kidney	<ul style="list-style-type: none"> • Bristles on brush appearance^a • Bouquet of flower appearance on IVP^a
Multicystic Dysplastic Kidney	• Bunch of grapes appearance ^a
Renal Artery Aneurysm	• Ring like calcification ^a
Ectopic Ureteric Orifice	• Drooping lily sign on IVP ^a
Retrocaval Ureter	• Fish hook or Reverse 'J' deformity on IVP ^a
Retroperitoneal Fibrosis	<ul style="list-style-type: none"> • Medial pulling of ureter or pipestem ureter^a • (Pipestem ureter is also seen in TB)
CA Renal Pelvis	• Goblet sign or stipple sign on RGP ^a

Radiological feature	Disease
• Rim/crescent sign ^a • Soap bubble appearance ^a	Hydronephrosis
• Spider leg appearance ^a	Polycystic Kidney
• Flower vase appearance of ureter ^a	Horse shoe Kidney
• Golf hole ureter ^a	TB bladder
• Drooping lily sign ^a	Ectopic ureter
• Cobra head or Adder head appearance ^a • Spring onion appearance ^a	Ureterocele
• Egg in cup appearance ^a	Analgesic nephropathy causing papillary necrosis
• Thimble bladder ^a	Tubercular chronic cystitis
• Sandy patches ^a	Schistosomiasis of bladder
• Chalice/ Bergman sign ^a	Ureteric dilatation distal to neoplasm

• Fish hook bladder ^Q	BPH
• B/L spider leg appearance ^Q	Polycystic kidney
• Swiss- cheese nephrogram ^Q	
• Sun burst nephrogram ^Q	

Radiological Appearance		
Acute Pancreatitis	Chronic Pancreatitis	CA Pancreas
<ul style="list-style-type: none"> • Renal halo sign^Q • Gasless abdomen^Q • Ground glass appearance^Q • Colon cut off sign^Q • Sentinel loop^Q 	<ul style="list-style-type: none"> • Chain of lakes appearance^Q • String of pearl appearance^Q • Beaded appearance^Q • Numerous irregular calcifications^Q are pathognomonic (on X-ray) 	<ul style="list-style-type: none"> • Double contour of medial border of duodenal C loop • Double duct sign^Q • Dilated/widening of duodenal C loop^Q • Mucosal irregularity^Q • Scrambled egg appearance • Inverted/reverse 3 sign of Frostberg^Q • Rose thorning of medial wall of 2nd part of duodenum^Q

Annexure 10

Suspected Carcinogens	
Carcinogens	Associated Cancer or Neoplasm
Alkylating agents	• Acute myeloid leukemia ^Q , bladder cancer ^Q
Androgens	• Prostate cancer ^Q
Aromatic amines (dyes)	• Bladder cancer ^Q
Arsenic	• Cancer of the lung ^Q , skin ^Q
Asbestos	• Cancer of the lung ^Q , pleura ^Q , peritoneum ^Q
Benzene	• Acute myelocytic leukemia ^Q
Chromium	• Lung cancer ^Q
Diethylstilbestrol (prenatal)	• Vaginal cancer (clear cell) ^Q
Epstein-Barr virus	• Burkitt's lymphoma ^Q , nasal T cell lymphoma ^Q
Estrogens	• Cancer of the endometrium, liver, breast ^Q
Ethyl alcohol	• Cancer of the breast, liver, esophagus, head & neck ^Q
Helicobacter pylori	• Gastric cancer ^Q , gastric MALT lymphoma ^Q
Hepatitis B or C virus	• Liver cancer ^Q
HIV	• Non-Hodgkin's lymphoma, Kaposi's sarcoma, squamous cell carcinomas ^Q (especially of the urogenital tract)
Human papilloma virus	• Cancers of the cervix, anus, oropharynx ^Q
Human T cell lymphotropic virus	• Adult T cell leukemia/lymphoma type 1 (HTLV-1) ^Q
Immunosuppressive agents (azathioprine, cyclosporine, glucocorticoids)	• Non-Hodgkin's lymphoma ^Q
Ionizing radiation (therapeutic or diagnostic)	• Breast, bladder, thyroid, soft tissue, bone, hematopoietic ^Q
Nitrogen mustard gas	• Cancer of the lung, head & neck, nasal sinuses ^Q
Nickel dust	• Cancer of the lung, nasal sinuses ^Q
Diesel exhaust (miners)	• Lung cancer ^Q
Phenacetin	• Cancer of the renal pelvis & bladder ^Q
Polycyclic hydrocarbons	• Cancer of the lung, skin (SCC of scrotal skin) ^Q
Radon gas	• Lung cancer ^Q
Schistosomiasis	• Bladder cancer (squamous cell) ^Q
Sunlight (ultraviolet)	• Skin cancer (SCC & melanoma) ^Q
Tobacco (including smokeless)	• Cancer of the upper aerodigestive tract, bladder ^Q
Vinyl chloride	• Liver cancer (angiosarcoma) ^Q

Annexure 11

FAMILIAL CANCER SYNDROMES

Familial Cancer Syndromes			
Syndrome	Genes	Locations	Cancer Sites and Associated Traits
Breast/ovarian syndrome	BRCA1	17q21 ^a	Cancer of breast, ovary, colon, prostate ^a
	BRCA2	13q12.3 ^a	Cancer of breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma ^a
Cowden's disease	PTEN	10q23.3 ^a	Cancer of breast, endometrium, thyroid ^a
FAP	APC	5q21 ^a	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	hMLH1 ^a	3p21 ^a	Colorectal cancer, endometrial cancer, transitional cell carcinoma of ureter and renal pelvis, carcinomas of the stomach, small bowel, pancreas, ovary ^a
	hMSH2 ^a	2p22-21	
	hMSH6	2p16 ^a	
	hPMS1	2q31.1	
	hPMS2	7p22.2 ^a	
Hereditary papillary RCC	MET ^a	7q31 ^a	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	
Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	p53	17p13 ^a	Breast cancer, soft tissue sarcoma, osteosarcoma, brain tumors, adrenocortical carcinoma, Wilms' tumor, phyllodes tumor (breast), pancreatic cancer, leukemia, neuroblastoma ^a
	hCHK2	22q12.1	
MEN-1	MENIN ^a	11q13 ^a	Pancreatic islet cell tumors, parathyroid hyperplasia, pituitary adenomas ^a
MEN-2	RET ^a	10q11.2	Medullary thyroid cancer, pheochromocytoma, parathyroid hyperplasia ^a
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	NF1 ^a	17q11 ^a	Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain tumors ^a
Neurofibromatosis -2	NF2 ^a	22q12 ^a	Acoustic neuromas, meningiomas, gliomas, ependymomas ^a
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	STK11 ^a	19p13.3 ^a	Gastrointestinal carcinomas, breast cancer, testicular cancer, pancreatic cancer, benign pigmentation of skin and mucosa ^a
Retinoblastoma	RB ^a	13q14 ^a	Retinoblastoma, sarcomas, melanoma, malignant neoplasms of the brain and meninges ^a
Tuberous sclerosis	TSC1	9q34	Multiple hamartomas, RCC, astrocytoma
	TSC2	16p13	
von Hippel-Lindau syndrome	VHL ^a	3p25 ^a	RCC, hemangioblastomas of retina and CNS, pheochromocytoma ^a
Wilms' tumor	WT ^a	11p13 ^a	Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation ^a

Annexure 12

SUTURES

Suture	Types	Raw material	Tensile strength	Absorption rate
Silk	Braided or twisted multifilament ; Coated (with wax or silicone) or uncoated	Natural protein Raw silk from silkworm	Loses 20% when wet; 80–100% lost by 6 months	Fibrous encapsulation in body at 2–3 weeks ; Absorbed slowly over 1–2 year ^a
Catgut	Plain	Collagen derived from healthy sheep or cattle	Lost within 7–10 days	Phagocytosis and enzymatic degradation within 7–10 days ^a
Catgut	Chromic	Tanned with chromium salts to improve handling and resist degradation in tissue ^a	Lost within 21–28 days	Phagocytosis and enzymatic degradation within 90 days
Polyglactin (Vicryl)	Braided multifilament	Copolymer of lactide and glycolide ^a in a ratio of 90:10, coated with polyglactin and calcium stearate	Approx, 60% remains at 2 weeks; 30% remains at 3 weeks	Hydrolysis minimal until 5-6 weeks; Complete absorption 60-90 days ^a
Polyglyconate	Monofilament Dyed or undyed	Copolymer of glycolic acid and trimethylene carbonate ^a	Approx, 70% remains at 2 weeks; 55% remains at 3 weeks	Hydrolysis minimal until 8-9 weeks; Complete absorption 180 days ^a
Polyglycaprone	Monofilament	Copolymer of glycolite and caprolactone ^a	21 days maximum	90–120 days ^a
Polyglycolic acid (Dexon)	Braided multifilament Dyed or undyed Coated or Uncoated	Polymer of polyglycolic acid ^a	Approx, 40% remains at 1 weeks; 20% remains at 3 weeks	Hydrolysis ^a minimal at 2 weeks; significant at 4 weeks; Complete absorption 60–90 days ^a
Polydioxanone (PDS)	Monofilament dyed or undyed	Polyester polymer ^a	Approx, 70% remains at 2 weeks; 50% remains at 4 weeks; 14% remains at 8 weeks	Hydrolysis minimal at 90 days; Complete absorption 180 days ^a

Guidelines for Day of Suture Removal by Area

Body Regions	Removal	Body Regions	Removal
Eyelid	3–4	Chest, abdomen	8–10
Eyebrow	3–5	Ear	10–14
Nose	3–5	Back	12–14
Lip	3–4 ^a	Extremities	12–14
Face (other)	3–4 ^a	Hand	10–14
Scalp	6–8 ^a	Foot, sole	12–14

Annexure 13

NEW DRUGS IN SURGERY

New Drugs in CA Breast	
Ixabepilone	• Used for anthracycline and taxane resistant breast cancer ^Q
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • Second line Her-2-neu therapy ^Q
Sunitinib	• Approved for advanced renal cancer and refractory metastatic breast cancer ^Q

New Drugs	
Drug	Indication
Imatinib mesylate	• GIST • CML
Sunitinib	• Imatinib resistant GIST • Advanced Renal cancer • Refractory metastatic breast cancer ^Q
Sorafenib	• Unresectable HCC ^Q
Geftinib	• Adenocarcinoma lung in non-smoking females
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • Second line Her-2-neu therapy ^Q

Annexure 14

INHERITANCE PATTERN

Autosomal dominant	Autosomal Recessive	X-Linked Disorders
<ul style="list-style-type: none"> Familial hypercholesterolemia HNPCC FAP^Q BRCA1 and BRCA2 breast cancer Hereditary hemorrhagic telangiectasia Marfan's syndrome^Q Hereditary spherocytosis^Q Adult polycystic kidney disease Huntington's chorea^Q Acute intermittent porphyria^Q Osteogenesis imperfecta^Q von Willebrand's disease^Q Myotonic dystrophy^Q Familial hypertrophic cardiomyopathy Neurofibromatosis^Q Tuberous sclerosis^Q Otospongiosis^Q Achondroplasia^Q 	<ul style="list-style-type: none"> Deafness Albinism^Q Wilson's disease^Q Hemochromatosis^Q Sickle cell anemia^Q beta thalassemia^Q Cystic fibrosis^Q Hereditary emphysema (α_1 antitrypsin deficiency) Homocystinuria^Q Freidrich's ataxia^Q Phenylketonuria^Q Fanconi's Syndrome Gaucher's Disease 	<ul style="list-style-type: none"> Hemophilia A^Q (recessive) G6PD deficiency^Q (recessive) Ducchene/Becker muscular dystrophy^Q (recessive) Fabry's disease Ocular albinism Testicular feminization Chronic granulomatous disease Hypophosphatemic rickets^Q (dominant) Fragile-X syndrome^Q (recessive) Color blindness^Q

Annexure 15

MOST COMMON TYPE OF STONES

Most Common Type of Stones	
Gall bladder	Cholesterol ^Q (Mixed if given in the option)
Pancreas	Calcium carbonate ^Q
Kidney	Calcium oxalate ^Q
Primary Bladder Stone	Ammonium urate ^Q
Secondary Bladder Stone	Uric acid > Struvite ^Q
Prostate	Calcium phosphocote ^Q
Salivary gland (Submandibular)	Calcium carbonate ^Q

Annexure 16

NAMED HERNIA

Gibbon's hernia	• Hernia with hydrocele ^Q
Berger's hernia	• Hernia into pouch of Douglas ^Q
Beclard's hernia	• Femoral hernia through opening of saphenous vein ^Q
Amyand's hernia	• Inguinal hernia containing appendix ^Q
Ogilvie's hernia	• Hernia through the defect in conjoint tendon just lateral to where it inserts with the rectus sheath ^Q
Stammer's hernia	• Internal hernia occurring through window in the transverse mesocolon after retrocolic gastrojejunostomy ^Q
Peterson hernia	• Hernia under Roux limb after Roux-en-Y gastric bypass ^Q

Annexure 17

IDEAL TIME FOR TREATMENT

Ideal time for Treatment	
Undescended testis	6 months ^Q
Hypospadias	6–12 months ^Q
Umbilical hernia	5 years ^Q
Cleft lip	3–6 months ^Q
Cleft palate	6–18 months ^Q

Annexure 18

INVESTIGATION OF CHOICE

Investigation of Choice	
Barium swallow	Hiatus hernia ^q Zenkers diverticula ^q Leiomyoma ^q
Barium meal	Gastric diverticula ^q
Barium meal follow-through	Small bowel diverticula ^q
Enteroclysis	Crohn's disease ^q
Barium enema	Colonic diverticula ^q
CECT	Diverticulitis ^q GIST ^q Mesenteric cyst ^q GI tuberculosis ^q Acute pancreatitis ^q Chronic pancreatitis ^q Carcinoma pancreas ^q Pancreatic pseudocyst ^q Carcinoma gall bladder ^q Hepatocellular carcinoma ^q (Triple phase CT) Renal cell carcinoma ^q Retroperitoneal fibrosis ^q Retroperitoneal sarcoma ^q Renal tuberculosis ^q ADPKD ^q
MRI	Brain tumors ^q Spinal cord tumors ^q Pancoast tumor ^q Soft tissue sarcoma ^q Staging of carcinoma penis ^q
Endoscopy with biopsy	Barrett's esophagus ^q Carcinoma esophagus ^q Carcinoma stomach ^q
Colonoscopy with biopsy	Carcinoma colon ^q
Sigmoidoscopy with biopsy	Carcinoma rectum ^q
Proctoscopy with biopsy	Carcinoma anal canal ^q
Cystoscopy with biopsy	Carcinoma bladder ^q
FNAC	Carcinoma breast ^q Parotid tumors ^q Thyroid malignancies ^q
Biopsy	Skin malignancies ^q Carcinoma penis ^q Oral cavity malignancies ^q
Manometry	Achalasia cardia ^q Diffuse esophageal spasm ^q Nutcrackers esophagus ^q
24-hours pH monitoring	GERD ^q

Somatostatin receptor scintigraphy (IOC for localization)	All neuroendocrine tumors of pancreas except insulinoma ^a Carcinoid tumors ^a
Ultrasound	Gallstones ^a Acute cholecystitis ^a Chronic cholecystitis ^a

Investigation of Choice	
Acute mesenteric ischemia	• Angiography ^a
Mesenteric venous thrombosis	• CECT ^a
Chronic mesenteric ischemia	• Aortography ^a

Investigation of Choice	
ADPKD	CT scan ^a
Retroperitoneal Fibrosis	
Medullary Sponge Kidney	IVP ^a
VUR	MCU ^a
Retrocaval ureter	MRI ^a
PUJ Obstruction	DTPA scan ^a
Renal structure or surface	DMSA scan ^a

Annexure 19

TUMOR MARKERS

Markers	Associated Cancers	Non-neoplastic Conditions
Hormones		
<ul style="list-style-type: none"> Human chorionic gonadotropin Calcitonin Catecholamines 	<ul style="list-style-type: none"> Trophoblastic tumors^a, nonseminomatous testicular tumors Medullary carcinoma^a of thyroid Pheochromocytoma^a 	<ul style="list-style-type: none"> Pregnancy
Oncofetal Antigens		
<ul style="list-style-type: none"> Alpha-Fetoprotein CEA 	<ul style="list-style-type: none"> Liver^a cell cancer, nonseminomatous^a germ cell tumor of testis, lung^a cancer Adenocarcinoma of the colon^a, pancreas^a, lung^a, breast^a, ovary^a, prostate^a 	<ul style="list-style-type: none"> Cirrhosis, hepatitis Pancreatitis, inflammatory bowel disease, smoking
Isoenzymes		
<ul style="list-style-type: none"> Prostatic acid phosphatase Neuron-specific enolase Lactate dehydrogenase 	<ul style="list-style-type: none"> Prostate cancer Small cell cancer of lung^a, Neuroblastoma^a Lymphoma, Ewing sarcoma 	<ul style="list-style-type: none"> Prostatitis, prostatic hypertrophy Hepatitis, hemolytic anemia, many others
Specific proteins		
<ul style="list-style-type: none"> Immunoglobulins PSA and prostate specific membrane antigen 	<ul style="list-style-type: none"> Multiple myeloma^a and other gammopathies Prostate cancer^a 	<ul style="list-style-type: none"> Infection, MGUS Prostatitis, prostatic hypertrophy^a
Mucins and other Glycoproteins		
<ul style="list-style-type: none"> CA-125 CA-19-9 CD30 CD25 	<ul style="list-style-type: none"> Cancer of ovary^a, fallopian tube, endometrium^a, cervix, breast^a, lung^a, pancreas^a and colon^a Colon^a cancer, pancreatic^a cancer Hodgkin's disease^a, anaplastic large cell lymphoma Hairy cell leukemia, adult T cell leukemia/lymphoma^a 	<ul style="list-style-type: none"> Pregnancy^a, endometriosis^a, PID^a, uterine fibroids^a Pancreatitis, Ulcerative colitis

Annexure 20

MOST COMMON

Small-Bowel Neoplasm
<ul style="list-style-type: none"> • MC tumor of small bowel: Leiomyoma^Q > Adenoma^Q • MC tumor of small bowel in children: Lymphoma^Q • MC malignant tumor of small bowel: Carcinoid > Adenocarcinoma^Q • MC site of small bowel malignancy, carcinoids, lymphoma: Ileum^Q • MC site of carcinoid tumors or distribution (BIRACS)^Q: Bronchus > Ileum > Rectum > Appendix > Colon > Stomach

Liver Neoplasm
<ul style="list-style-type: none"> • MC malignancy of liver: Metastasis^Q • MC primary malignancy of liver: HCC^Q • MC primary malignancy of liver in children: Hepatoblastoma^Q • MC benign tumor of liver: Hemangioma^Q

<ul style="list-style-type: none"> • MC complication of both end and loop colostomy: Parastomal hernia^Q • Complications (both parastomal hernia and prolapse) are more common in loop colostomy^Q as compared to end colostomy. • MC complication of ileostomy: Skin irritation^Q • MC early complication of ileostomy: Ischemic necrosis^Q
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Indications of Liver Transplantation
<ul style="list-style-type: none"> • MC indication for LT: Cirrhosis from Hepatitis C (HCV)^Q • 2nd MC indication for LT: Alcoholic liver disease^Q • MC indication for LT in children: Biliary atresia^Q • MC metabolic disorder requiring LT: Alpha-1 antitrypsin deficiency^Q • MC indication for LT following acute liver failure: Acetaminophen toxicity^Q

Pediatric Tumors	
<ul style="list-style-type: none"> • MC malignant tumor of infancy • MC extracranial solid tumor in children • MC abdominal malignancy in children 	Neuroblastoma ^Q
• MC primary malignant renal tumor of childhood	Wilm's tumor ^Q
• MC renal tumor of infancy	Congenital mesoblastic nephroma ^Q
• MC soft tissue tumor in infants and children	Rhabdomyosarcoma ^Q
• MC solid tumor of childhood	Brain tumor ^Q
• MC cancer of childhood	Leukemia ^Q (30%) > Brain tumors ^Q (22%)

• MC cancer in males (PLC): Prostate > Lung > Colorectal ^Q
• MC cancer in females (BLC): Breast > Lung > Colorectal ^Q
• Cancer deaths in males (LPC): Lung > Prostate > Colorectal ^Q
• Cancer deaths in females (LBC): Lung > Breast > Colorectal ^Q

Annexure 21

MISCELLANEOUS

• Widest portion of colon: Cecum ^a
• Narrowest portion of colon: Sigmoid ^a
• MC site of colonic rupture caused by distal obstruction: Cecum ^a
• Colon absorbs water, NaCl ^a ; secretes K⁺, HCO₃ and mucus ^a
• MC site of ischemic colitis : Splenic flexure

Sarcomas with Lymph Node Metastasis (MARCES)	
• Malignant fibrous histiocytoma ^a	• Clear cell sarcoma ^a
• Angiosarcoma ^a	• Epithelial sarcoma ^a
• Rhabdomyosarcoma ^a	• Synovial sarcoma ^a

Tumors with Spontaneous Regression (NCR MR)	
• Neuroblastoma ^a	• Malignant melanoma ^a
• Choriocarcinoma ^a	• Retinoblastoma ^a
• Renal cell carcinoma ^a	

Malignancies associated with Migratory Thrombophlebitis	
• CA pancreas (MC) ^a	• Prostate cancer ^a
• CA lung ^a	• Ovarian cancer ^a
• GI malignancies ^a	• Lymphoma ^a

• Trousseau's syndrome: Migratory thrombophlebitis ^a
• Trousseau's sign: Carpopedal spasm in hypocalcemia ^a
• Troisier's sign: Palpable left supraclavicular LN (Virchow's node) ^a

Condition	Seen in
Necrolytic erythema migrans	• Glucagonoma
Erythema chronicum migrans	• Lyme's disease
Erythema infectiosum (fifth disease)	• Parvovirus B19
Erythema marginatum	• Acute rheumatic fever

Perineural Spread is seen in	
1. Adenoid cystic carcinoma ^a	3. Cholangiocarcinoma ^a
2. CA GB ^a	4. Ductal adenocarcinoma of pancreas ^a

Small Round Blue Cell Tumors (WEL PNR)	
• Wilm's tumor	• Primitive neuroectodermal tumor
• Ewing's sarcoma	• Neuroblastoma
• Lymphoma	• Rhabdomyosarcoma
• Medulloblastoma	• Askin tumor
• Small cell variant of osteosarcoma	• Desmoplastic small cell tumor

Causes of Postoperative Fever	
Day	Cause
2–5 days	• Atelectasis of the lung ^a
3–5 days	• Superficial and deep wound infection ^a
5 days	• Chest infection including viral respiratory tract infection, UTI and thrombophlebitis ^a
> 5 days	• Wound infection, anastomotic leakage, intracavitary collections and abscesses ^a

New Recommendations

- **Aspirin** need not be stopped before surgery^a
- **Thyroid medications** should be continued^a
- **Anti-hypertensives** should be continued (even losartan)^a
- **OCPs** should be continued till day of surgery^a
- **Anti-depressants, anti-epileptics, anti-psychotics** should be continued except **TCA**, which should be stopped 3 weeks before surgery due to risk of intraoperative arrhythmia^a
- **Ticlopidine**: 14 days before surgery^a
- **Clopidogrel**: 7 days before surgery^a
- **Warfarin**: 3 days before surgery^a
- **LMWH**: 12 hours before surgery^a

Increased Cancer Risk in Obese Patients (PEEL CP GO KBC)

<ul style="list-style-type: none"> • Prostate^a • Endometrial^a • Esophagus^a • Liver^a 	<ul style="list-style-type: none"> • Cervix^a • Pancreas^a • Gall Bladder^a • Ovarian^a 	<ul style="list-style-type: none"> • Kidney^a • Bile duct^a • Breast^a • Colon and rectum^a
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Psammoma Bodies (PSM)

1. Papillary carcinoma thyroid^a
2. Papillary carcinoma (RCC)^a
3. Serous cystadenoma^a
4. Meningioma^a

Proctoscope	10–12 cm ^a
Rigid sigmoidoscope	25 cm ^a
Flexible sigmoidoscope	60 cm ^a
Colonoscope	160 cm ^a

• Most radiosensitive ovarian tumor	• Dysgerminoma ^a
• Most radiosensitive brain tumor	• Medulloblastoma ^a
• Most radiosensitive testicular tumor	• Seminoma ^a
• Most radiosensitive lung tumor	• Small cell CA ^a
• Most radiosensitive kidney tumor	• Wilms tumor ^a
• Most radiosensitive bone tumor	• Ewing's Sarcoma ^a and Multiple myeloma ^a

Condition	Seen in
• Necrolytic erythema migrans	• Glucagonoma
• Erythema chronicum migrans	• Lyme's disease
• Erythema infectiosum (fifth disease)	• Parvovirus B19
• Erythema marginatum	• Acute rheumatic fever

Screening Immunohistochemistry

• Epithelial Markers: Cytokeratin (positive in carcinomas) ^a
• Lymphoid Markers: CD-45 (positive in lymphoma) ^a
• Melanocytic Markers: S-100 (positive in melanoma) ^a
• Mesenchymal Markers: Vimentin (positive in sarcoma) ^a
• Neuroendocrine Markers: Chromagranin and neuron specific enolase ^a

Annexure 22

SURGICAL POSITIONS

Supine position	<ul style="list-style-type: none"> • MC surgical position, patient lies with back flat on operating room bed
Trendelenburg position	<ul style="list-style-type: none"> • Same as supine position but the upper torso is lowered^Q.
Reverse Trendelenburg position	<ul style="list-style-type: none"> • Same as supine but upper torso is raised & legs are lowered^Q.
Fracture Table Position	<ul style="list-style-type: none"> • For hip fracture surgery • Upper torso is in supine position with unaffected leg raised. Affected leg is extended with no lower support. The leg is strapped at the ankle and there is padding in the groin to keep pressure on the leg and hip.
Lithotomy position	<ul style="list-style-type: none"> • Used for gynecological, anal & urological procedures^Q. • Upper torso is placed in the supine position, legs are raised and secured, arms are extended^Q.
Fowler's position	<ul style="list-style-type: none"> • Begins with patient in supine position. Upper torso is slowly raised to a 90° position^Q.
Semi-Fowler's position	<ul style="list-style-type: none"> • Lower torso is in supine position & upper torso is bent at a nearly 85° position. The patient's head is secured by a restraint.
Prone position	<ul style="list-style-type: none"> • Patient lies with stomach on the bed. Abdomen can be raised off the bed.
Jackknife position	<ul style="list-style-type: none"> • Also called the Kraske position^Q • Patient's abdomen lies flat on the bed. The bed is scissored so the hip is lifted & legs & head are low^Q.
Knee-chest position	<ul style="list-style-type: none"> • Similar to the jackknife except the legs are bent at the knee at a 90° angle.
Lateral position	<ul style="list-style-type: none"> • Also called the side-lying position, it is like the jackknife except the patient is on his or her side. Other similar positions are Lateral chest & Lateral kidney.
Lloyd-Davies position	<ul style="list-style-type: none"> • Common position for surgical procedures involving the pelvis & lower abdomen. • Majority of colorectal & pelvic surgery is conducted in the Lloyd-Davis position^Q.
Kidney position	<ul style="list-style-type: none"> • Patient's abdomen is placed over a lift in the operating table that bends the body to allow access to the retroperitoneal space. • A kidney rest is placed under the patient at the location of the lift.
Sims' position	<ul style="list-style-type: none"> • Variation of the left lateral position • Patient will roll to his or her left side. Keeping the left leg straight, the patient will slide the left hip back and bend the right leg. This position allows access to the anus^Q.

Abdominal Examination Signs		
Sign	Description	Diagnosis
Aaron sign	Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney's point ^Q	Acute appendicitis ^Q
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg's sign	Transient abdominal wall rebound tenderness ^Q	Peritoneal inflammation
Carnett's sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier's sign	Palpable gallbladder in presence of painless jaundice ^Q	Periampullary tumor ^Q
Cruveilhier sign	Varicose veins at umbilicus (caput medusae) ^Q	Portal hypertension ^Q
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill's sign	Abdominal wall mass that does not cross midline and remains palpable when rectus contracted	Rectus muscle hematomas
Mannkopf's sign	Increased pulse when painful abdomen palpated	Absent if malingering
Ransohoff sign	Yellow discoloration of umbilical region	Ruptured CBD ^Q
Ten Horn sign	Pain caused by gentle traction of right testicle ^Q	Acute appendicitis ^Q